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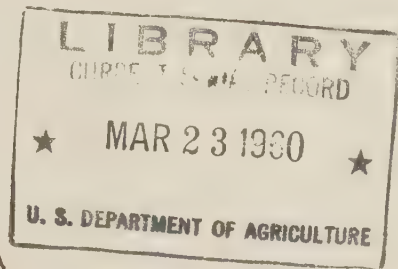
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Soil Conservation

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SOIL CONSERVATION

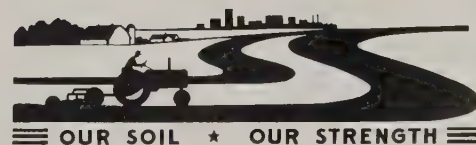
EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

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★ THIS MONTH ★

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TOM DALE, Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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WATER INFILTRATION was cut in half when a legume-grass sod was turned under and the soil worked into a fine seedbed, according to a study by H. D. Ayers of the Ontario Agricultural College of Guelph, Canada.

With the loam soil protected by a legume-grass cover crop, the infiltration capacity was over 1.6 inches per hour during the first 60 minutes of simulated rainfall. But when the sod was turned under and worked into a fine seedbed, the infiltration rate dropped to .8 inches per hour.

Ayers thinks the initial infiltration on the bare soil was retarded mainly because of air being trapped in the soil. He points out that, even on the bare soil, the infiltration capacity was fairly good; but, intense summer rains may exceed the soil's capacity to take in water.

Editors are invited to reprint material originating in this magazine.



FRONT COVER—A spring fed pond stocked with trout in the Silver Creek Soil Conservation District, near Silver-ton, Oreg.

Photo by Frank G. Roadman

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A Look At Urbanization

By A. B. BEAUMONT

EAST, West, North, South! There is where I found it, urbanization of farm land, that is. I was asked to gather information on the nature and extent of the conversion of farmland to urban developments, how it is affecting soil conservation district activities, and the thinking of district supervisors and SCS personnel about the proper course of action in connection with it.

I had been an interested but rather casual observer for years of this kind of land use in my own State. I knew that it was proceeding fast locally, but I did not know that it was a nationwide, rapidly accelerating, land-use phenomenon. I was amazed at what I saw in some places.

The most rapid and intense recent housing development was noted at Norfolk, Va., where naval installations have mushroomed since World War II. Baltimore and Annapolis, Md. will probably have coalesed into one solidly built city within 25 years. In fact, this will be true of much of the Atlantic seaboard between Washington and Boston within 50 years. But I was more surprised to see the rapid urbanization in the Dallas-Ft. Worth and Houston areas of Texas. At the present rate of growth, Dallas and Ft. Worth will coalesce into one huge megalopolis within another third of a century.

In carrying out my assignment, I traveled in 12 States, east, west, north, and south, saw what was happening, and talked with 203 persons informed on the subject. Of these, one-third were soil conservation district supervisors, a little more than that were SCS personnel, and the remainder included county agents, specialists in agriculture, planning board directors, and others acquainted with the situation. The States visited were Massachusetts, Connecticut, Rhode Island, New Jersey, California, Oregon, Illinois, Michigan, Maryland, Virginia, Georgia, and

Texas. The purpose of this article is to summarize my observations and the information obtained in interviews.

Because of improved highways and relatively cheap motor transportation, urbanization is no longer confined to fairly concentric circles around cities, as was formerly the case. It often develops in more or less isolated spots or areas where conditions are favorable. In southeastern Michigan, with its hundreds of lakes, a lakeside is often the starting point of a housing development. Large industries, distributing houses, or government facilities are often the nuclei of clusters of housing projects. Good examples of such development were seen in Virginia and Texas. In all States the strip or "shoestring" developments alongside of highways were seen.

All types of soil and land are being occupied in the process of urbanization. Largely because of lower construction costs, preference is usually given to level or nearly level land, free from



Note:—The author made this study while he was a consultant of the Soil Conservation Service. Formerly he was State Conservationist of SCS for Massachusetts.

stones, and clear of trees and brush. This is especially true in case of housing developments. In the selection of industrial sites, location usually seems to be the controlling factor. Hills are leveled and swamps filled, regardless of cost. Good examples of this were noted in eastern Massachusetts.

The high cost of valuable agricultural land is not much, if any, deterrent in taking land for industrial sites. Outstanding examples of this were seen in Bergen County, N.J. where a vegetable farm of 22 acres was sold for \$12,000 an acre, and in the Los Angeles River Valley, where an alfalfa and bean farm of 132 acres was sold

for \$20,000 an acre. Some of the best examples of good land use in locating housing developments were noted in Georgia, in which Class VII (forest) land was occupied. Such land often landscapes beautifully.

A multitude of uses are being made of diverted land. The largest single percentage goes into housing developments. A large percentage goes into industrial sites, shopping centers, school sites, recreation parks and fields, airports, drive-in theaters, and filling stations. Also highway right-of-ways account for a large percentage.

A farm of 140 acres near Peabody, Mass., about 15 miles north of Boston, which was under a district conservation agreement, is being converted into a large shopping center. About 70 stores will be constructed. A Boston paper last summer carried an article which stated that three downtown Boston stores "which represent over 100 years of successful retailing" have closed. Many shoppers, on account of congested traffic and parking problems are abandoning city stores for outside shopping centers. Some cities are fighting this trend with their urban renewal projects.

Urbanization of farmland, of course, reduces the quantity of food locally produced in the urbanized areas. The loss of farms makes this inevitable. For example, in Randolph Township in Morris County, N.J. recently there were 27 herds of 7 or more cows each. Within a year the total cow population had shrunk to 40 cows.

Local vegetable production has decreased in the area surrounding many cities. A good example of this was found in Genesee County, Mich., in which the city of Flint is located. In that county the number of acres of vegetables harvested decreased from 1,433 in 1944, to 816 in 1954; and, the corresponding figures for fruit were 3,292 and 2,276.

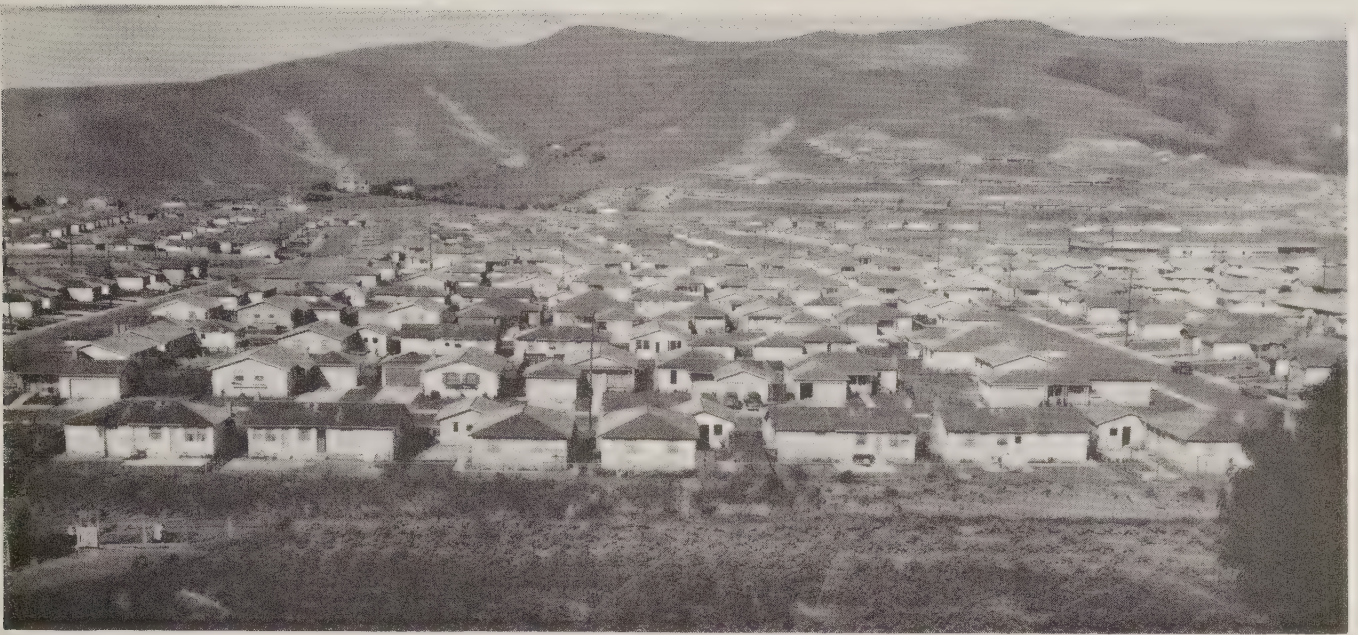
But no one is complaining about a shortage of food. There is none. If local farmers fail to supply the market, food comes in from other, often distant, areas to fill the vacuum. Some people complain about the high price of food, but no one is charging it to urbanization. Belford Seabrook, of Seabrook Farms, N.J. said he thinks the pinch will eventually be felt first because of the high cost of transportation rather than the amount of food available.

The total taxes paid by real estate have in-



The urbanization of a Maryland valley: (above) an aerial view of the valley when it was a farming community; (below) the same valley after a housing development had been completed.





Urbanization developments, especially housing projects, usually are on fairly level land, while steeper slopes of less productive land remain idle.

creased because of urbanization. This is due to an increase in the tax rate or the assessed value or both. But in most cases it was due to increased tax rates. With the great demand for new school buildings, the extension of sewer systems, water supplies, and other urban utilities, increased taxes are inevitable. The total taxes on a farm of 152 acres near Los Angeles, Calif. increased from \$4,000 in 1952 to \$20,000 in 1956.

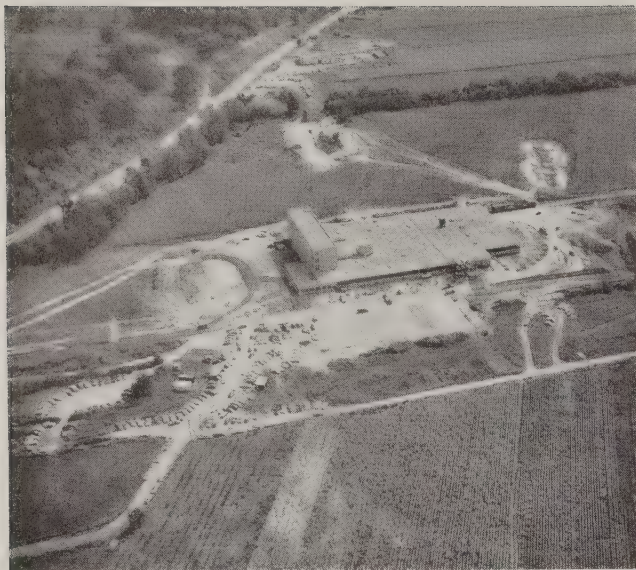
The strongest factor in determining taxes in most recently urbanized areas is the building and maintenance of new schools. Forty to fifty percent of the real estate taxes usually goes for schools. In many localities the tax rate has doubled or tripled within the past 10 years. A district supervisor in Hartford County, Conn. said the rate in his town had more than tripled within that period. In some areas there has been little, if any, change in assessment of farmland within recent years. Some assessors, especially those in areas still dominated by farming interests, give preferred treatment to farmland; but others are putting pressure on farmers to force them to sell. In the highly urbanized township of Monroe, Conn. farmland is assessed at \$1,000 an acre; present selling prices are \$1,000 to \$1,500 an acre.

While the proximity of a farm to the consuming public is usually an advantage marketwise,

it often has disadvantages otherwise. First, the prospect of a farmer's selling his land at urban prices is more or less demoralizing from the standpoint of farming. Much idle land was seen in all areas undergoing urbanization. Some of such land had been sold or optioned to real estate speculators. In some cases, the farmers were just waiting and hoping to harvest the unearned golden increment. Some soil conservation districts have lost a number of cooperators. Southeast Livingston District in Michigan formerly had 150 cooperators; now it has only about 50 active farms. Many full-time operators have taken jobs in industry and become part-time farmers. This was noted particularly in Michigan and Georgia.

Second, increases in taxes on farmland make it difficult for the farmer to make a profit. Attempts are being made, with more or less success, in several States to prevent or reduce such increases by special zoning legislation or the incorporation of farm municipalities. Most progress in agricultural zoning has been made in California. Within the limits of Los Angeles, "Dairy City" has been incorporated for protection of the dairy farmers.

Third, as a tobacco farmer and district supervisor in Hartford County, Conn. pointed out, it is difficult to farm with hordes of children from nearby housing developments running



Many new industrial plants are built on level farmland well away from cities in order to have plenty of space for buildings and parking grounds.

over one's farm. They damage crops, break down fences, tamper with equipment (may be injured), and pilfer produce. In northern Illinois some fields of tall corn were seen interspersed, checkerboard fashion, with housing or industrial developments, but in most areas farming declines sharply as urbanization advances.

In general, the consuming public is not much concerned about the loss of farmland because of urbanization. Belford Seabrook of New Jersey has been interested in this matter several years, and has made a number of talks to groups about it. He has reported general apathy on the part of the public. He said people will not be much concerned so long as food can be purchased at a reasonable price. William Heffert, Jr., editor of *Farm and Garden Magazine* suggested that perhaps the best way to interest the general public in scientific land use is to approach the people through their interest in conserving land for recreational uses and water supplies. These are topics in which they are now keenly interested.

The present pattern of urbanization, as seen in 12 States, is not the result of widespread planning. In most places, the great urban sprawl is, like Topsy, "just growing." In several States, notably California, Michigan, Illinois, New Jersey, and Virginia, county planning boards have an interest in the preservation of

farmland and are making some progress through zoning. In most States, however, planning by city boards for the benefit of the cities is the only kind being done. The impression I obtained of the whole situation is that broad land-use planning is in a state of confusion. There is no general agreement as to objectives or how to reach them.

Should land-use capabilities be a major guide for planning? Should farmland be preserved by zoning regulations? These are some of the questions. The Monmouth County, N. J. Planning Board held a public hearing to consider the question of zoning for agricultural use. Leaders in agriculture were present. No one requested that land be zoned for agriculture, so the matter was dropped.

Through field contacts, I found that farmers differed considerably in their attitude toward zoning. Some, especially the younger ones with good businesses, and some for sentimental reasons, desired protection against the encroachment of urbanization. Most of them, however, are opposed to restrictions in the sale of their land and many of them want to see the day hastened when they can reap the golden harvest they have not yet been able to bring in. This latter viewpoint was definitely expressed by a district supervisor, a potato grower, in Rhode Island.

Many owners of farm property who derive their income from sources other than farming are genuinely interested in improving and conserving their land regardless of the income from it. These people need and get technical assis-



Much farmland in areas that are becoming urbanized lies idle; the owners wait for the golden harvest that will come when they sell the land for urban developments.

tance from SCS through local districts. Farm ponds, reforestation, and pasture improvement were found to be the practices most commonly in demand by rurbanites. For example, a wealthy lady in Fairfield County, Conn. was interested in sheep and wanted a pasture for them. Request for water diversion or drainage come from homeowners with wet basements. Part-time farmers request and obtain about the same type of service as is given full-time farmers. Finally, many city people with a home in the country or a farm, and knowing practically nothing about soils or land use, are just hungry for any information along these lines they can get.

From Portland, Oreg. to Ft. Worth, Tex., I found that a high percentage of requests for assistance come from rurbanites. This varied from about 10 percent to 80 percent. Included are part-time productive farmers and non-farming land occupiers. Following is a breakdown of requests received in one Massachusetts district: 50 percent from full-time productive farmers; 25 percent from part-time farmers; 20 percent from non-farming land occupiers having 3 acres or more of land; and, 5 percent from owners of small lots.

A rather general procedure in districts visited is for the district to enter into agreement with and help make a plan for those having 3 acres or more of land. Those with less than 3 acres are usually given only consultative service and a roughly outlined plan. One of the problems in working with rurbanites is that of finding a mutually acceptable time for the land occupier and the technician to get together. Many of the rurbanites want only weekend and holiday service. Some of the technicians have been able to adapt themselves to such a schedule without too much inconvenience. Others have tried it and later abandoned it because it was found too burdensome.

To the question of whether non-farming land occupiers are entitled to technical assistance through soil conservation districts, all persons quizzed, with one exception, gave an affirmative answer. In fact, assistance of some kind is now being given this group in all districts visited. One district supervisor in Illinois said technical assistance should be given to farmers only, but he hedged when asked what he would do in case an erosion problem was involved.

Reasons given to support the view that non-farmers are entitled to assistance were generally as follows: (1) All pay taxes and, therefore, help support the SCS. (2) All land, regardless of ownership or use, should be protected. This view was well-expressed by a supervisor in Connecticut when he said he thinks first of the land and second of its ownership. Practically the same view was voiced by a supervisor in California, who added that it was also good public relations. (3) Practices or the lack of them on land in urban ownership may seriously affect adjoining farmland. (4) If technical service is denied non-farmers, they would probably demand a similar service and would probably get it, so great and influential are their numbers. An area conservationist in northern Illinois said: "If we don't service these boys from La Salle Street (Chicago), they will develop their own service." With few exceptions, both district supervisors and technicians favored giving first priority to requests from productive, full-time farmers. A few supervisors thought that all requests should be handled in the order in which received.

Contour Strips Replace Stone Fences

By ALBERT E. NEWBY

CONTOUR stripcropping paid off where it counts most—in the milk pail—for Tony Hapanowich of Sherman, Conn. During the dry summer of 1957, most New England crops wilted in the field, while the Hapanowich family farm produced over 225 tons of corn silage on a piece of run-out native pasture.

Steep, rocky hillsides, divided into small fields by stone walls, are characteristic of western Connecticut. What to do with such pieces of land is the problem confronting many dairy farmers. Lime and fertilizer stimulate native grasses for spring and fall pasture. But, bluegrass and white Dutch clover rest during hot weather. Plowing and seeding such fields often result in a poor stand, with topsoil being washed downhill to pile up against a stone wall.

Note:—The author is work unit conservationist, Soil Conservation Service, Danbury, Conn.



Clearing trees and brush from the Hapanowich farm.

Tony Hapanowich had recently taken over the farm at the death of his father. All of the farm's flatland had been drained and was producing to its fullest. Three small, steep, rocky fields that commanded the view from the front porch presented a challenge. To get this hillside producing was Tony's aim; but, how to do it safely and within the budget was the question.

This was one of the problems discussed by Tony and the Soil Conservation Service man as they prepared a plan for the farm. To crop the slope within its capabilities would mean contour strips. For efficient strips, the stone walls would have to be removed. The expense of re-



Harvesting corn silage on stripcropped field of Hapanowich farm after stone fences and trees were removed.

moving 2,535 feet of stone wall plus some 65 large elms growing in the walls could not be handled by the farm budget.

Tony applied to the County Agricultural Stabilization and Conservation Committee. They agreed to assist by paying 20 cents a foot for wall removal and \$3 per acre for contour strips. Assured of \$591, Tony began removing trees from the walls, helped by brothers Bob and Walt.

As fast as the trees were cut, they were hauled down the 15 to 19 percent slope by tractor—sometimes two tractors became necessary—and placed in a windrow. A hired bulldozer dug and shoved out field stones. Walls were either buried, or pushed into a nearby swamp. Several large elm roots, too tough for the 'dozer, had to be dynamited. Holes were filled and grading was completed by the bulldozer.

The new 28-acre field was laid out in strips about 100 feet wide. A rotation of 1-year corn and 5 to 7 years of hay was decided on. Alternate strips were treated with 12 tons of manure fortified with superphosphate. After plowing, 600 pounds of 10-10-10 fertilizer were applied and harrowed in. This was followed by 600 pounds of 10-10-10 in the planter.

When the drought came the contour strips trapped meager showers and held water close to the growing corn. The hillside yielded better than 15 tons of corn silage to the acre while Tony's neighbors were getting less than 10. And the young farmer didn't mind one bit to hear visitors call it, "the best-looking crop of corn in the whole of Fairfield County!"

SUBSOIL NUTRIENTS.—Tests with radioactive materials show that corn, on some soils, gets more than half the phosphorous it needs from the subsoil, if both the topsoil and subsoil have plenty of this plantfood, according to soil scientists of the University of Wisconsin. They think that potassium and other essential plant food elements may also be obtained largely from the subsoil.

Soil tests to find out fertilizer needs for crops have in the past been confined largely to tests of the plow layers of fields. The Wisconsin soil specialists contend that the fertility of the subsoil should also be taken into account in recommending fertilizer needs.

Future Farmers Of Oklahoma Compete On Conservation

By TOM T. HAMILTON

THE Oklahoma air was still and hot that August evening in 1955. The greenery of the grass on the golf course and the peace of a day drawing to a close perhaps had something to do with the birth of the idea.

As three men walked toward the buildings up the hill, where a big feed was being laid out for leaders of the next day's activities, the most prosperous of the three thought out loud: "Wish I could figure a way to spend some of my money to encourage soil conservation."

Soil conservation had naturally been the topic of conversation, because the other men were two of Oklahoma's leaders in that field. One was Leon J. "T-Bone" McDonald, assistant State conservationist, of the Soil Conservation Service, the other was Luther Nunley, SCS work unit conservationist in the Major County Soil Conservation District.

The prosperous man was Joe C. Scott, president of Bankers Service Life Insurance Company of Oklahoma City and former president of the State Board of Agriculture. Oklahoma's now-famous Future Farmers of America Soil Conservation District Contest was thus conceived on a golf course in western Oklahoma and has since spread to eight States by popular demand.

Much work went into the preparation of a formal plan and rules for the contest. The Future Farmers of America were chosen as the youth group to participate because a more workable plan could be built around it. A group of former Vo-Ag teachers, "turned" conservationists, did most of the job of preparing rules for the contest. They included R. H. Geick of Altus, Charles Kilpatrick of Bartlesville, Walter Jessee of Durant, and Ivan Dilley of Perry. Also, there was Ted Lehman of Chickasha (the

only one without a Vo-Ag background). Each man developed his own plan for the contest. Then they met, took the best from each plan, and developed the final working plan. Their guiding philosophy was to "get youth into conservation."

The first annual event got off the ground in January 1956, after receiving the green light from State Vo-Ag supervisor, J. B. Perky, Joe C. Scott, the State Soil Conservation Board, and officials of the State Association of Soil Conservation Districts.

Competition is fierce between FFA chapters for the \$500 top prize and trophy given each year. And it is fierce between local chapters in each of the State's 87 soil conservation districts where the winning chapter gets \$50. Other cash awards are given for scrapbooks containing clippings, photos and programs, and for top-notch written reports of accomplishments, which each chapter competing must submit. An individual boy can win from \$5 to \$50 (depending on how he places in the final) for being one



Joe C. Scott, contest sponsor, presenting the first year's trophy to Paul Singleterry, president of the Marlow FFA chapter.

Note:—The author is educational assistant, Oklahoma State Soil Conservation Board, Oklahoma City, Okla.

of the 9 area winners in the soil conservation speech division—and he can rack up additional points for his chapter, too.

Many boys will go to almost any length to pile up points for their chapter. A bonus of 20 points is added to the chapter's total for each speech given to an organized group. One FFA member's mother was giving a baby shower to which 18 ladies had been invited. The son persuaded her to let his chapter's speaker make a little talk. When the ladies came for the shower, they got a 10-minute talk on the virtues of soil conservation—and the persistent youths earned 20 points for their chapter.

Chapters can earn points in a variety of ways: By cooperative activities with their soil conservation district, by signing-up new cooperators, with tours and demonstrations, Soil Stewardship Week activities, showing films, writing newspaper stories, putting on TV and radio shows, and supervising poster contests.

Many SCDs place conservation equipment with FFA chapters for them to schedule out to members and cooperators. The chapters collect rentals and maintain the equipment. Some chapters have bought equipment of their own to rent out.

Working relationships between FFA chapters and SCDs, up to now unheard of, have developed. The Calvin FFA chapter hand-stripped 1,000 pounds of Indiangrass seed and sold it to the local district when the district was badly in need of it to help farmers revegetate land. Broken Arrow FFA chapter planted a Bermuda-root, increase plot and sold over \$4,000 worth of roots to district cooperators in one year. Valliant FFA chapter was deeded 160 acres of timber land as a memorial to Herman C. Stauter so that the FFA boys and others could learn how to be tree farmers.

Cooperators in Oklahoma SCDs have been on the increase since the contest started in 1956.

In one district an outstanding farm leader



Ted Wilkerson, FFA advisor at Marland (right), receives the winner's plaque for the 1956-57 contest from Hershel Burrus, executive director of the State Soil Conservation Board (left), while J. B. Perky, State supervisor of Vocational Agriculture, and Joe C. Scott look on.

was not a cooperator, and would have nothing to do with the SCD. But his son was an FFA member. The boy persuaded his dad that it would be a feather in the son's cap to win points for his chapter if his dad would sign up. The father was soon visiting with the work unit conservationist to find out what conservation is all about—and he is now a good cooperator.

Showings of conservation films have increased tremendously since the contest started. In most districts the WUC meets with all Vo-Ag teachers to work out cooperative plans at the beginning of the contest period in July. They decide on films to be shown and develop a schedule with the State SCS office. One film may be shown by 5 chapters during 1 week, which gets good mileage out of films. Films are shown not only to the chapter members but to many other groups.

According to the contest rules, an FFA chapter in an area not organized into a SCD could not compete. Oklahoma had one county not organized. The FFA chapters in this area launched an all-out campaign to organize a district. Thus, the Kingfisher County District was organized in December 1956!

Most chapters now have a memorandum of understanding with their SCD. One point covered is that many districts have virtually turned over to the FFA much of their educational activities. These include essay and poster contests for schoolchildren, conservation films, tours and demonstrations, TV and radio shows, speech contests, conservation benefits statements, and Soil Stewardship Week promotion.

The contest has been going nearly 3 years and is getting better all the time, conservationists and Vo-Ag officials agree. The 1955-56 event was won by the Marlow FFA chapter, with the speech division being won by George Langley of the Stroud FFA. The second annual event, which ended last summer, was taken by the Marland chapter. State conservation speech winner was Alfred Zavodny of the Perry FFA, who won over the other 8 area winners and won \$50 for himself and points for his chapter.

The third annual contest will be over this summer. The speech division was completed in April, with Jerry Case from Marland the winner. This will mean more points for Marland, which won the contest last year. It is estimated over half the chapters in Oklahoma are com-



FFA members from Amber, Okla., sprigging bermuda-grass in a waterway as one of their activities in the soil conservation contest.

peting for the \$7,500 in prizes furnished by Bankers Service Life Insurance Company and Joe C. Scott.

Ted Wilderson, Marland FFA advisor, says: "Through the contest, conservation's valuable lesson has been integrated into our complete school system through the 12 grades. All students have participated either in poster, speech, and essay contests, tours, prepared grass samples, or have seen films and displays. But most important of all the FFA boys, who will be our farmers of tomorrow, have been taught the value of soil conservation to our community.

"Warren Case, one of our farmers, says the most important benefits our community has received from our FFA activities is the increased interest in soil conservation among the young people. Even the small children, and he has a son 14 and a daughter 10, are asking about soil conservation.

"This day-after-day contact with the soil conservation program by our community, plus the thousands of people that live outside our community who have been reached by our activities, has already paid dividends in this short span of time, and its future effects can only be speculation."

Wilkerson sums up by saying, "Though we know we have benefited much, both as a chapter and as a community, we feel the effects of our program will have an influence in our community for many years to come."

T-Bone McDonald sums up the contest this way: "Until this came along, adults and districts worked together. When a man died, all the work of education had to be started on the new farm operator. Now when a new farm operator takes over he is already a 'cooperator.'"

"The boys who learn conservation now, in 4 years of high school, will have it in their hearts all their lives. Even if they do not farm, they will always be advocates of soil conservation."

Some of the most ardent supporters of the contest, of course, are Vo-Ag officials themselves. State Vo-Ag head, J. B. Perky told his teachers recently, "Districts have helped us, and we have helped districts. We have emphasized many times that one of our biggest and most important jobs is to do everything we can to speed up the protection and improvement of our soil and water resources. **THE BEST PLACE TO BEGIN IS AT HOME, IN YOUR OWN SCHOOL DISTRICT.**"

Soil Knowledge Orbits The Earth

By LLOYD M. ADCOCK

THE attendance of 26 contestants from 13 foreign countries at the annual National Land Judging Contest attests its dramatic value in stimulating interest in land management and proper land use.

In the farm area surrounding Oklahoma City, Okla. contestants gathered from schools and farms throughout the United States, and with the foreign visitors in the international division of the contest, they studied the physical features of the soil. They classified land according to its capabilities, and placed each parcel of land into the correct one of eight classes. Then they judged the proper use of each piece of land and selected necessary conservation measures.

The judging process is, in effect, to make an inventory of the soil, to learn to analyze land problems, and to make decisions regarding its wise and economic use.

Foreign contestants were enthusiastic about this contest method of teaching about soils. Francisco Palis of the Philippines said, "Land judging contests will attract interest among people. They will be eye openers for those who have little knowledge of the value of soil and water and the importance of conserving them."

In a land judging contest, the field becomes a classroom where the subject comes to life—even for the nonprofessional. Eavesdropping on

a discussion among foreign visitors, we harvested a pithy summary of this concept. "We have had soils information crammed in our heads, but, we have never before had a method for bringing it out and making use of it."

Raymond Welpott, manager of Station WKY-TV, monetary sponsor of the event, presented a trophy to the international champion, Amin Subari of Indonesia, and medals to four others: Francisco Garcia-Ramos of Spain, the runner-up, Luis Llanos of Spain, third; John Selvaratnam of Ceylon, fourth; and Armando Garcia of Spain, fifth.

The international champion, Mr. Subari, had this to say about why he likes the contest idea, "Because this mass education is simple and interesting, yet sufficient enough to give contestants an idea of how important is the conservation of soil, it will work. Although the conditions in Indonesia and the United States are very different, the ideas and considerations in carrying out soil conservation work are nearly similar."

Prabir K. Ray who comes from India, where land is very important (since about 80 percent of the population live in villages and are employed in farming) said, "Propagation of knowledge about land to our vast mass of people on lines similar to land judging contests may be most useful."

"Because a land judging contest is very good

Note:—The author is program specialist, foreign training division, Foreign Agricultural Service, Washington, D. C.

program to teach about the soils, I hope we can establish it," said Sadik Deniz of Turkey.

A. H. M. Abul Hafiz, who was there from Pakistan stated, "It is in this way, that we can make our people conscious about land and its management."

"In my country, youth has more capacity in receiving the new ideas than the old farmers do. These farmers, generally speaking, are illiterate and rooted to the primitive agricultural practices. I think we can change the agricultural landscape through the young people. I have never before seen the tremendous amount of money, energy, and publicity utilized for spreading the gospel—Know Thy Land," were the comments of Landivaldo Mello Motta of Brazil.

Enthusiasm came also from Francisco G. Salazar of the Philippines, who said, "This method will teach the young people of our country to understand better the soil and its better use, and to conserve the soil for future generations."

The 26 contestants in the international division of the contest were sponsored by the Inter-

national Cooperation Administration. Participation was a part of their study program developed by the U. S. Department of Agriculture and cooperating land-grant colleges.

"Participation of foreign visitors in the events, particularly their attendance at the leaders' dinner was inspiring to us," said William A. McGalliard of the Noble Foundation who spoke at a dinner where the visitors were honored.

At a chicken dinner held in the Woman's building of the Oklahoma State Fairgrounds, winners of the National 4-H Club division, FFA teams, and college teams were honored along with the international division.

WKY-TV, the Agricultural Extension Service, Soil Conservation Service, Vocational Agriculture departments, and a host of business firms cooperated in sponsorship.

Countries represented in addition to those mentioned were Afghanistan, Chile, Greece, Thailand, and Korea.

With so much enthusiasm shown by people from around the globe, it would seem that soil knowledge is set to orbit the earth.



Lloyd M. Adcock (left) and J. M. Ives of the Oklahoma Extension Service (right), pose with winners of the international division of the Land Judging Contest at Oklahoma City. The award winners are, (left to right), Amin Subari of Indonesia, Francisco Garcia-Ramos of Spain, Luis Llanos of Spain, John S. Selvaratnam of Ceylon, and Armando Garcia of Spain.

BIOLOGICAL CONTROL OF POTATO SCAB

No: 36

This is the thirty-sixth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

by J. D. MENZIES

MILLIONS of dollars worth of crops are lost each year through damage from plant disease organisms that have accumulated in otherwise productive soil. These unseen enemies, in company with such other soil pests as nematodes, insects, and weeds can be thought of as problems in biological conservation and reclamation. They may be less obvious than sheet erosion, gullies, salt accumulations, or high water tables, but their effects on soil productivity are similarly harmful.

Soil-borne plant disease organisms are not only highly destructive but discouragingly difficult to control. The potato scab fungus is a good example. It has been feared by farmers and studied by pathologists for as long as potatoes have been cultivated. Yet, today, we are far from having a reliable and practical method for scab control. Let us look at the size of the problem and review our progress.

Scab occurs in all major potato areas of the world. Potato varieties differ in susceptibility, but few commercial varieties are resistant. The scab organism apparently exists in many strains and can mutate readily to adapt to changing conditions. It is a typical soil inhabitant, that is, it can live indefinitely in the soil in the absence of potatoes. Recent research has shown that this pathogen can grow and increase on the roots of many plants including cereals.

The standard recommendation for root disease control is rotation. But we know now that

the best rotation practices often do little more in controlling scab than to slow down its rate of increase. Rotations are desirable in many other respects, but unless supplemented by other practices are not an adequate answer to potato scab.

How about resistant varieties? There is definite hope here, and several new resistant varieties have been developed in this country through the National Potato Improvement Program. They are being grown to some extent commercially, but it is difficult to combine scab resistance with the many other qualities demanded of a successful potato variety. Breeding for resistance to unspecialized soil-borne organisms is a complex proposition and there always remains the danger of new strains of the pathogen appearing to attack any resistant variety.

Acidifying the soil to a pH below 5.5 sometimes controls scab, particularly in our eastern States. Potato growers in areas where this treatment is known to work are fortunate. In the irrigated West it is usually found that impractically high rates of sulphur are needed to acidify the soil. Research has shown, also, that even when infested soil is brought to a pH as low as 4 scab may still be severe. So this method cannot be recommended without local trials.

Potato scab can also be attacked with chemical fungicides. At present only a few chemicals are good soil fungicides, and these are so expensive that they are useful only on high value crops such as nursery stock or truck crops. A soil fungicide treatment would need to cost considerably less than \$50 per acre to be practical for use on potatoes.

The only fungicide now commercially available that comes close to doing this is pentachloronitrobenzene (PCNB). Under favorable circumstances PCNB will control scab for a per acre cost of \$40 to \$60. Often, however, much higher rates are needed on heavier or peaty soil. Also, the treatment is usually effective only for 1 year.

Since potato scab is peculiar in that the infection is confined to the tuber surface, it is

Note:—The author is microbiologist, soil and water conservation research division, Agricultural Research Service in cooperation with the Washington Agricultural Experiment Stations, Prosser, Wash.

not necessary to protect the entire root system. If fungicides can be applied in strips, so that only the tuber zone in the soil is treated, considerable saving in material can be made. This presents an engineering problem that equipment companies are trying to solve. Various types of strip mixing machinery have been developed for operation on or ahead of planters. If they prove successful the use of chemicals for scab control may be practical.

A fascinating possibility for the future is biological control of these soil-borne disease organisms through microbial antagonisms in the soil. It has long been known that certain soil organisms may be suppressed or destroyed by competitive organisms, and that changes in soil conditions favor some but inhibit others. In many cases it has been shown that plant pathogenic organisms are adversely affected by such microbial antagonisms resulting in less disease.

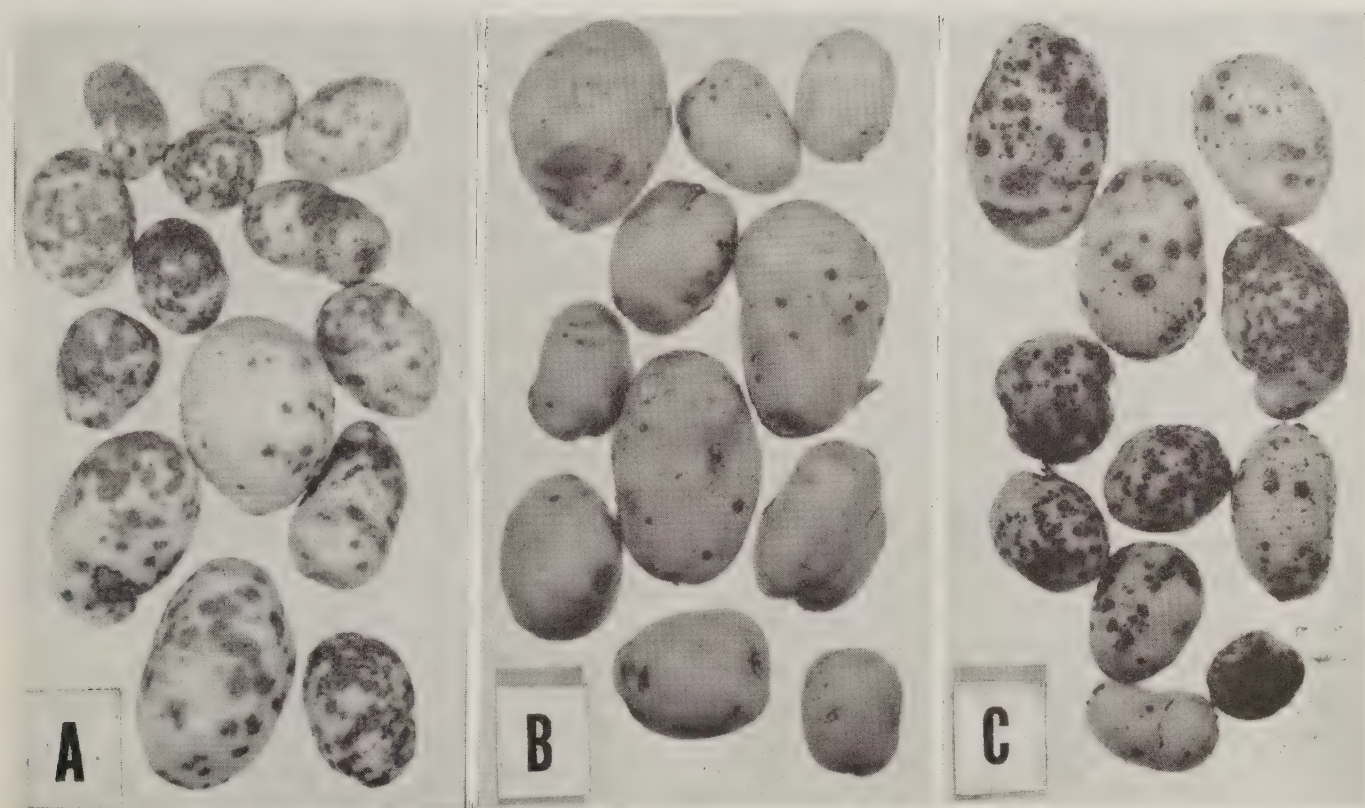
A baffling problem in trying to stimulate these biological effects for disease control is that soil treatments, such as crop sequence or green manures, are not consistent in their ac-

tion. A practice that stimulates biological control one time may fail to do so the next.

Obviously, we do not know enough about all the factors involved. But such control has been observed in nature so often that there is no doubt about its effectiveness.

We have been doing research on factors affecting survival of the scab organisms in the soil for several years and think that the method will some day be practical. The work started when it was found that certain potato soils were not only non-scabby, but even resisted the establishment of the scab organism. When the microbes of these soils were destroyed by steaming, scab could be easily introduced.

On further investigation in the greenhouse it was found that this scab-suppressing factor could be introduced effectively into scab-infested soil. As little as 1 percent of suppressing soil mixed into scabby soil stopped the development of the scab organism if alfalfa meal was also added as a microbial food source. This extra microbial nutrient is needed to give the suppressing organisms a chance to become established in competition with the microflora al-



Representative samples of potatoes grown in scab-control experiments: (A) untreated soil, (B) treated with alfalfa meal and suppressing soil, (C) treated with alfalfa meal only.

ready active in the scabby soil. Numerous tests have been conducted to show that both ingredients—the right organisms and an extra source of food—are needed before scab is overcome.

So far we have been unable to isolate the organism, or organisms, that are responsible for this biological control. Nor have we yet found out how to repeat the laboratory findings on a field scale. But a start has been made towards understanding and using nature's biological method of reducing the scab organisms in the soil.

Keeping our productive soils free from soil-borne pests is an often overlooked conservation problem. As in the case with other conservation efforts, more than one approach can be used. We can slow down these pests by rotations, and avoid much of their damage by using resistant varieties. We can attack them directly with pesticides, and we can manage our soils to stimulate the latent biological control mechanisms that already exist in our soils.

The scab problem shows that there are many difficulties to be overcome before we understand the biological balances that will hold undesired organisms in check. The development of management practices that encourage biological control may eventually provide the best answer.

SERVICING PART-TIME FARMERS.—Many of the cooperators with the Pickens Soil Conservation District in South Carolina work in nearby industrial plants. In order to know when each cooperator is available for contact, F. G. Lindsey, work unit conservationist, records on form 196 the shift on which he works. "And," Lindsey says, "you need also to know the farmer's sleeping habits, for nobody likes to be awakened in the middle of his 'night's' rest to talk about soil conservation."

VERTICAL MULCHING.—Rice hulls, packed into narrow trenches in an alfalfa field, boosted the yield a half ton per acre in one cutting by letting moisture go deeper into the soil.

This test of vertical mulching was made on land with a hardpan layer about 6 inches below the surface, which kept water from penetrating the subsoil.

A subsoiler was used to form the trenches and a special attachment to insert and pack the rice hulls. The trenches were 20 inches deep and 5 feet apart.

J. A. Vomocil and D. W. Henderson, soil and irrigation specialists of the University of California, conducted the experiments.

A Madison Avenue Conservationist

By BERNHARD A. ROTH

ED ZERN, advertising executive, outdoor writer, cartoonist, and conservationist, directs the American Motors Conservation Awards Program (started in 1953 as the Nash Conservation Awards Program).

Ed says: "This is a public relations program, but it's a lot more than that. It's recognition, by one of America's progressive corporations, that conservation of renewable natural resources is the responsibility of business and industry as well as of government and individual citizens. Basically, it is a program intended to put a spotlight on the professional conservationist whose work is seldom understood by the public and whose devotion to his work is matched only by the inadequacy of his salary. In distributing 10 professional and 10 nonprofessional awards, we try to find people whose work has been exceptional in some way but who ordinarily wouldn't get national recognition. For this reason we don't give awards to such relatively well-recognized conservationists as 'Ding' Darling or Olaus Murie, or to a public figure such as Fred Seaton, no matter how much we may approve their conservation action."

Ed and his committee are now making their fifth annual search for what George Romney, president of American Motors, calls "the unsung heroes on the conservation firing-line."

Romney believes that the auto industry has a big stake in natural resource conservation, and that pleasure motoring in America is directly related to maintenance of scenic values as well as conservation values.

American Motors has thus far brightened the outlook of 80 awardees in the United States and Canada. Checks amounting to \$20,000 have been distributed to professionals; bronze plaques worth \$4,000 have gone to full-time and amateur resource-guardians.

Outdoorsman Zern states that the awards idea dates back to a wilderness canoe trip in

Note:—The author is an information specialist, Soil Conservation Service, Upper Darby, Pa.

the Adirondacks of New York State. There, he heard about a wildlife biologist working zealously on a problem of deer-herd management. It was a tedious and technical matter of examining animal bones and marrow, determining age, signs of malnutrition, and so on. A job that would hardly make the front page.

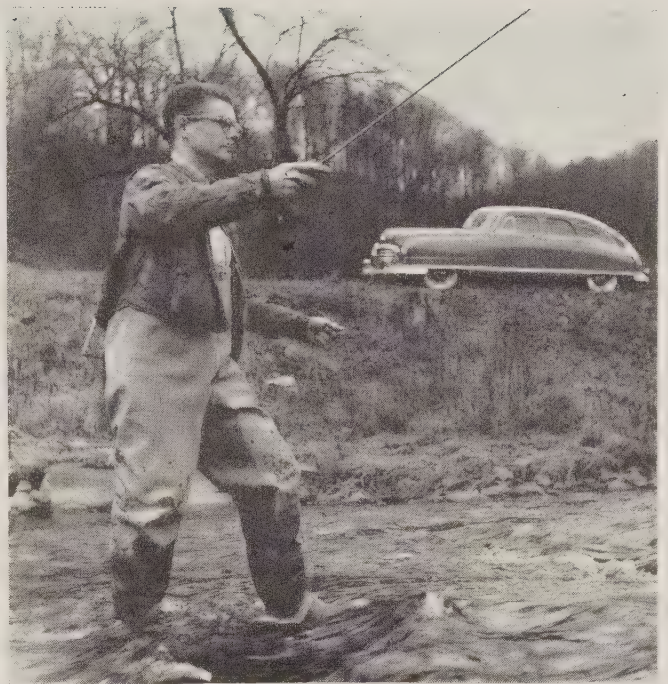
When Zern inquired as to the biologist's salary and other rewards, he was appalled by the answers. Then Ed decided to take a good look at an entire gamut of careerists in soil, water, fish, wildlife, and forestry conservation. "We were just plain thunderstruck by the number of individuals doing tremendously important things with no fanfare whatsoever—and usually for mighty little cash."

When he approached George Mason, president of the Nash Kelvinator Corporation (which has since merged with Hudson Motors to become the American Motors Corporation), and suggested a Conservation Awards Program, Mr. Mason approved enthusiastically. Mason was himself a devoted conservationist (national treasurer of "Ducks Unlimited") and, on his death in 1956, he left the property along the famous Ausable River in northern Michigan to the State to be held in perpetuity as a public fishing area.

Zern believes that the far-reaching results of the awards, since American Motors agreed to sponsorship, have been in the terms of public understanding. "We've publicized the awards heavily among hunters, fishermen, and other sportsmen. Some of them have asked why we always try to include soil, water, and forestry people, as well as fish and game men. That gives us and others a chance to explain that you can't have one resource without the other—that true conservation is necessarily a package deal!"

A random sampling of past awardees bears out Zern's assertion. The honor roll lists foresters who have protected wildlife areas from fire in Alaska; wiped out damaging insects in Oregon; improved North Carolina fishing streams by encouraging trees and woody cover on watersheds. And there are game men who have worked for Canadian hunters' safety; wiser bag regulations for West Virginians, and protection of wilderness areas in several States.

The list also reveals an Alabama housewife who got garden clubs to help clean streams; a



Ed Zern at one of his favorite avocations.

New Jersey physician who gives free lectures on bird appreciation; several soil conservationists who have helped landowners solve far-reaching flood, erosion, and wildlife problems. And at least one clergyman who convinced his flock that religion and resource-saving go hand in hand.

Unique with the American Motors awards program is its informality and the dashes of humor its director frequently applies to it. Zern is given to tall stories, fly-rods, varmint rifles, and vocalizing folk songs with a Spanish guitar. Unnecessary dignity bores him stiff. In a typical letter, he says, "No, we have no forms to fill out, no pictures to color, no affidavits to sign. Just give us your nomination in a letter, setting forth the nominee's qualifications in whatever detail is reasonable. No credit whatsoever will be given for neatness, spelling, or punctuation."

Since anyone, literally, may nominate anyone else, returns have occasionally swamped Zern and his cohorts with as many as a thousand applicants at a whack. The better, thinks Zern, the chances of finding people who really deserve recognition. Meanwhile, Room 1000, 595 Madison Avenue, New York 22, N. Y., is likely to remain a hotspot in the conservation world.

NATIONAL PLOWING CONTEST AND CONSERVATION EXPOSITION

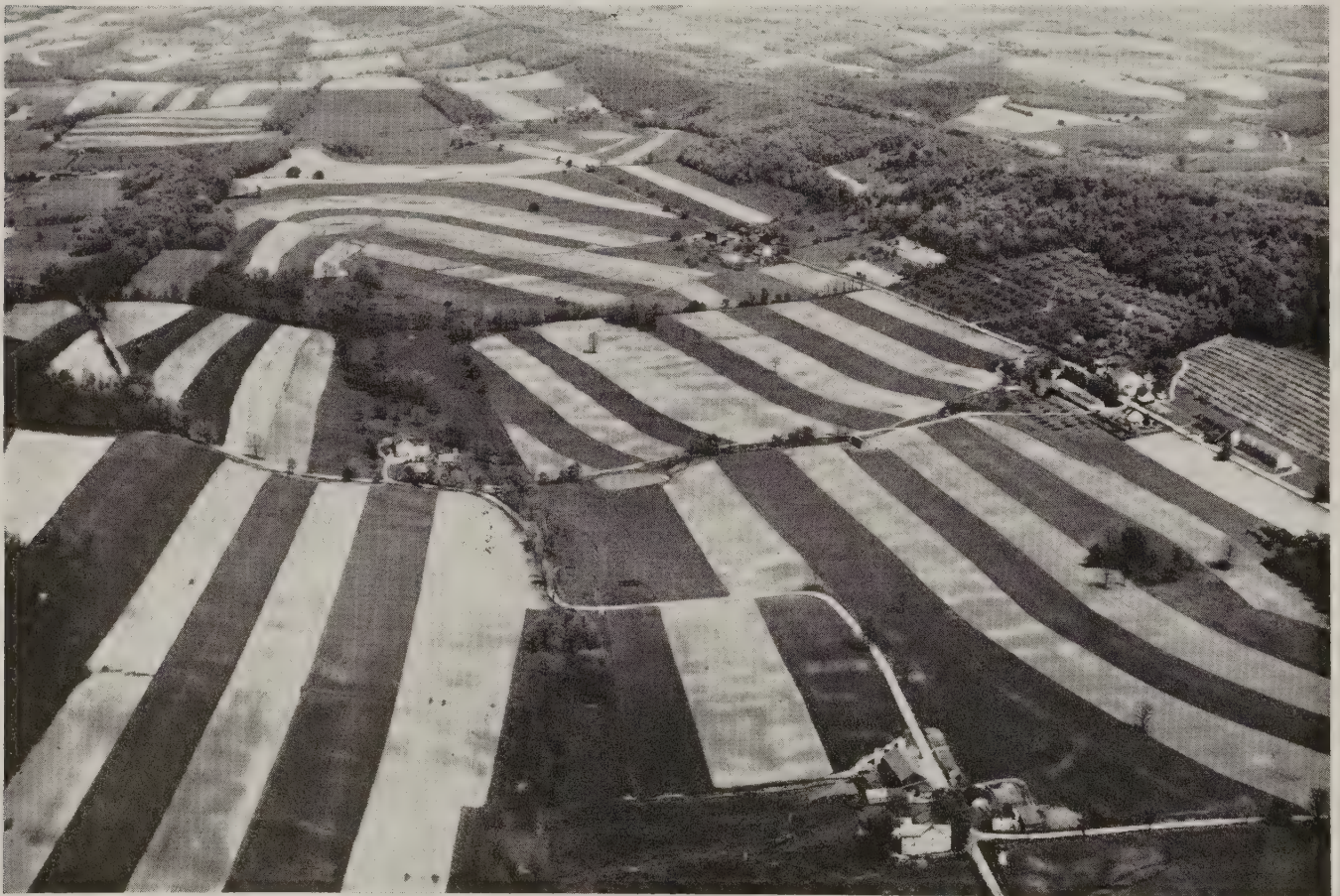
By IVAN McKEEVER

CONSERVATION leaders from across the Nation will come to the Keystone State for the 16th National Plowing Contest and Conservation Exposition, August 21 and 22, 1958. Over 2,000 acres of the Hershey Chocolate Company farms, Hershey, Pa., have been set aside for the exposition. Ground breaking ceremonies in April launched a crash program which will ready the site for the contest. More than 250,000 spectators are expected to attend the events.

Note:—The author is State Conservationist, Soil Conservation Service, Harrisburg, Pa.

There will be over 8 miles of planned conservation tours showing water and erosion control, agronomy, woodland, and wildlife practices. Six miles of the route will be seen from buses and 2 miles from wagon trains. Twenty-five buses and 90 tractors pulling 180 wagons will haul an expected 30,000 spectators over the demonstration area. Technicians trained in conservation will explain the practices.

Acres of exhibits will carry out the theme of working together through soil conservation districts. Displays will emphasize the role of



Aerial view of conservation farming in Pennsylvania Dutch country near Hershey, Pa.

Federal, State, and local groups in resource conservation in Pennsylvania.

Plowmen will compete for top honors in both level and and contour plowing. Skills in contour plowing will be tested on August 21, and straight furrows will be turned on the 22nd. Winners will compete in the World Plowing Matches in Germany.

Twenty-six acres of new and advanced farm machinery will be open for inspection. Earth movers used in conservation work will be demonstrated.

Federal and State agencies, soil conservation districts, and local groups are teaming with industry and agriculture to make the national event pleasant and educational.

The State Soil Conservation Commission of the State Department of Agriculture is giving overall leadership to the National Plowing Contest and Conservation Exposition. Pennsylvania State University is giving leadership in the handling of the plowing contest.

The Soil Conservation Service, the State Association of Soil Conservation District Directors, and other agencies are mainly responsible for development of the conservation exposition. The Hershey Estates is taking the leadership for local arrangements, finance, and other aspects pertinent to a smooth running program. Newspaper and public relations people are joining in to give publicity and relations work.

Hershey, in the heart of Pennsylvania Dutch Country, is easily reached by air and rail. Major highways pass through the town and the Pennsylvania Turnpike is nearby.

Hundreds of motels, hotels, inns, and tourist homes are arranging to handle the capacity crowd. Reservations are handled by the Hershey Information Bureau, Chocolate Avenue, Hershey, Pa. Restaurants and dining areas are stocking up with shoofly pie, apple-kuchen, and other Dutch foods. Air tours over scenic Pennsylvania Dutch country will be an added attraction.

All of Pennsylvania's 48 soil conservation districts will take some part in making the Conservation Exposition and Plowing Contest a success. Farm equipment companies have accepted an important role—and have helped to attract the forces of related industries such as steel, petroleum, and chemical firms.

The National Plowing Contest and Conser-

vation Exposition is being held in conjunction with the annual Pennsylvania Dutch Days. Famed Dutch handicraft and needlework will be demonstrated. Special exhibits on weeds, grasses, and fertilizers will be included, and dairy-minded visitors will have an opportunity to inspect some of the best dairy herds in the area.

Using The Water Twice

California Irrigators Use Pump-back System to Reuse Tail Water for Irrigating the Same or Adjacent Fields

By HERB BODDY

HANDY, pump-back systems are helping Sacramento County, Calif. farmers and ranchers use just about all of their irrigation water today.

Some 100 irrigators in four soil conservation districts, who reuse irrigation runoff through sump returns, say they like "second-hand" water much better than the tap kind. It's better for crops because it is warmer, richer, and contains plenty of leached fertilizer and manure. This extra waste water helps a lot when water is short and hard to get.

Up to now tail water has been a big loss in California where from 20 to 25 percent of irrigation water runs off at the lower ends of most fields.

Most irrigators, like Antonio Simas, who farms near Galt, try to put all their water to good use. The trick is to keep it from draining off. Some soils take water better than others. So if water doesn't soak in well, it's going to run away, especially if the irrigation runs have too much grade.

Like most ranchers, Tony doesn't like losing a drop of water. For a long time he was hard

Note: The author is information specialist, Soil Conservation Service, Berkeley, Calif.

pressed to find enough of it to go around on his 400 acres of irrigated pasture in the Lower Consumnes Soil Conservation District.

You'd call Tony a smart irrigator. Yet about one-fourth of his water ran off in a natural drain. He tried to apply the right amount of water to each check, but found this wasn't easy since he couldn't keep tab on his irrigator.

Tony's soils are San Joaquin which means they are moderately shallow over hardpan and claypan.

The Galt rancher watched a lot of good irrigation water go down the drain before he got around to putting in his first sump with help from Tim S. Jang, SCS engineer at Florin.

Using a bulldozer, Tony dug out about 13,000 cubic yards of earth in excavating 2 sumps at the lower end of his fields.

Under Tony's system, sump water is lifted by deep well pumps to a 1,222-foot concrete pipeline which carries it to the irrigation line and on to 25-foot spaced checks. Runs are 800 to 1000 ft., while the fall of fields averages .2 ft. per 100 ft.

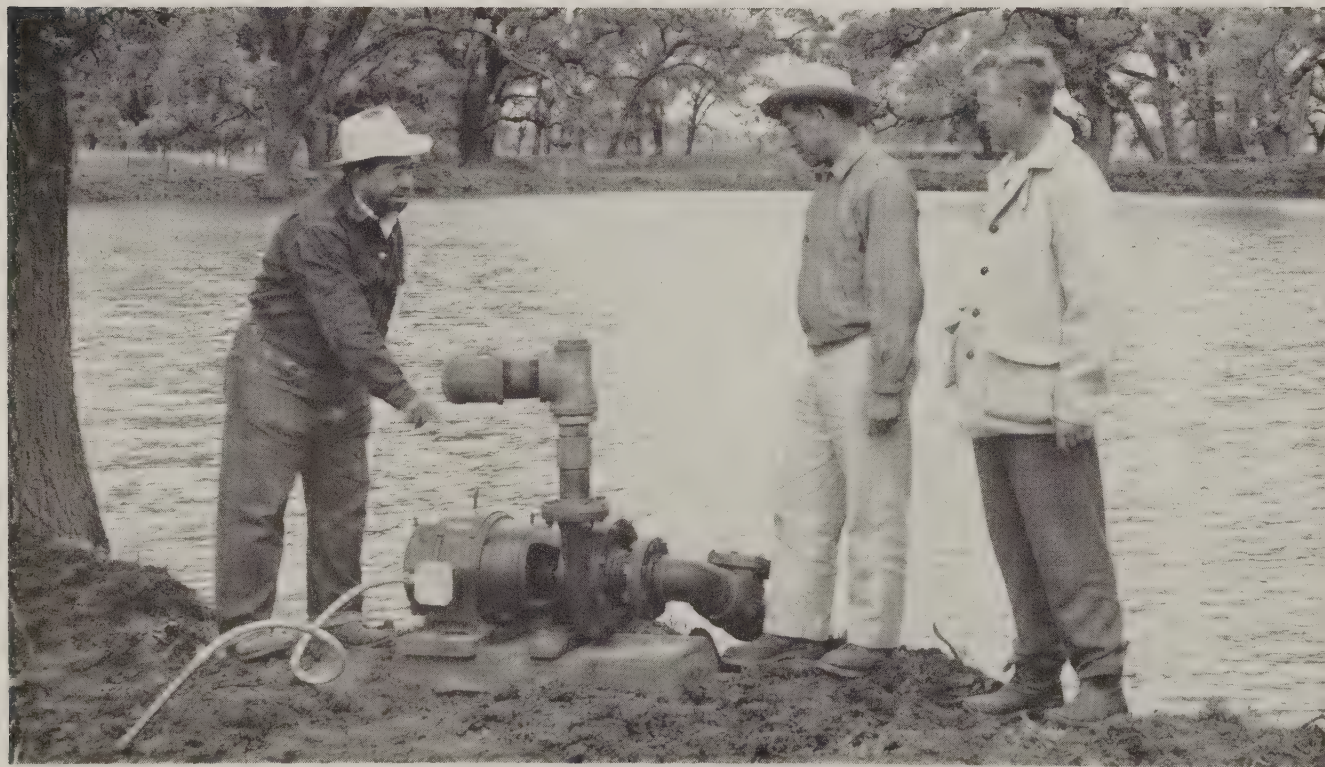
This spring, Tony started the long 8-month

irrigation season with 3 well-filled storage ponds and figures to pump most of the water back on pastures.

Last year, on one 60-acre field, he supplemented his well water with water from 1 sump and estimates he got water on three times as fast. This was due to the difference in water lifts. His 15 horsepower well pump, for example, lifts water 75 ft. to the pipeline, while the smaller 3 to 5 h.p. units pump only 12 ft. or so from water level to standpipes. Then gravity takes the water into the irrigation line. In Sacramento County 3 to 5 h.p. pumps work best.

Tony says: "A few years ago ranchers in Sacramento County had to be sold on return water systems. They just wouldn't buy the idea. Now 'pump-back' systems sell themselves.

"Look at all that water in my ponds, and I have hardly begun to irrigate. Those smaller pumps are going to reduce my power bill and I'll have more water too. I'm counting on irrigating around a fourth of my pasture with tail water—water that used to go to waste. Going to irrigate faster too."



Antonio Simas explains the operation of his 5 h.p. centrifugal pump, used to return tail water from the sump pool for reuse in irrigation, to Tim S. Jang of SCS and L. G. Koerth of county ASC office.

Return water units are for alkali-free lands, and you have to pick the right sites for sumps. Average cost of sumps and return ditches is under \$1,000 in Sacramento County.

Cost-sharing ACP funds helped Tony pay for a good part of his pump-back system.

As SCS staffer Jang will tell you, pump-back systems don't come under the head of "do-it-yourself" jobs.

He explains, "Tailwater can be reused on the same field, or on lower fields. You can return tailwater to fields by constructing 'back-graded' ditches and a sump next to the head ditch or pipeline. Water is then lifted by a sump pump, usually a centrifugal or low-lift one, into the head ditch.

"Where back-grading of a return ditch won't work, try locating the sump at the lower end of the field and bringing the water to the head ditch by return pipe. This method costs more than the return ditch.

"When runoff is to be used to irrigate fields below, locate the sump at the lower end of the fields, where the water comes from, and pump it into the pipeline."

There's a rule of thumb way of finding a good sump site. Figure how many acres of pasture will empty tailwater into the sump. Multiply this figure by 20 to get the cubic yards of sump needed. If a return ditch is to go in too, add this yardage. Also if you count on runoff from a neighbor's lands, make an increase in yardage for this.

Sumps and return ditches are easily and cheaply constructed with a carryall when land is dry. For wet soils, your best bet is a drag-line or back hoe. Time the sump job with land-leveling work so you can use the extra dirt for fills.

When Tony visited his birthplace in Portugal some time back, he had a good many things to tell the folks about the USA, Sacramento, and his well-managed pastures.

"But", he mused, "wait until I tell them about the luck I'm having with tailwater and sumps."

CONSERVATION IS A CONTINUING ACTIVITY. Our population is growing. Our economy is expanding. The pressures on our land resources are increasing. The need for managing these resources to protect and improve them is getting greater every year.

—Donald A. Williams, Administrator,
Soil Conservation Service

Water For Tomorrow

*Farmer-operated Irrigation District
Installs a \$200,000 Concrete Siphon
to Carry Water to 78 Farms*

By V. LENNIE HUSA,
AUGUST L. BONJONI,
and HOWARD C. BRANSON

THE farmer-operated Gardena Irrigation District near the Washington-Oregon State line, about 20 miles southeast of Walla Walla, Wash., had a serious maintenance problem. Howard Barnes, Dan Fisk, and Jennings Johnson, irrigation district directors, were charged with the responsibility of maintaining a 25-mile canal system, with numerous concrete grade control and diversion structures, and a critically important 7,621 foot long, 44-inch wood stave siphon.

An old wooden siphon joined the canal system between two hilltops, 163 and 130 feet high. It was beginning to feel the effects of old age and 26 years of useful, productive service. The wood staves and closely spaced steel bands were beginning to fail at an increasingly alarming rate. Something major had to be done in the way of siphon replacement if irrigation of the 5,374 acres of land below the siphon was to be continued. These 78 farming units that raised alfalfa, grass, grain, and sugar beets depended on the siphon carrying the water for their very existence.

E. C. Burlingame investigated the virgin area on horseback, and later designed and laid out the original canal system in 1910. He is credited with much of the early beginning of irrigation in this 7 to 8 inch annual rainfall area.

The irrigation district directors, with their ditch supervisor, "Pete" Hanson, contacted Gerald Thola, SCS work unit conservationist assisting the South Walla Walla Soil Conservation District, for engineering and planning as-

Note:—The authors are respectively area engineer, engineering aid, and conservation aid, Soil Conservation Service, Colfax, Wash.



A break in the wooden Pine Creek siphon that forced its replacement with a concrete siphon.

sistance. The SCS investigation included running surveys of the project site and checking siphon materials available. Proposals with cost and benefit estimates were prepared for the irrigation district directors.

After a review of the proposals, the directors decided on 45 or 48 inch reinforced concrete or concrete cylinder pipe. SCS engineers prepared final plans and specifications for these alternates, and on November 12, 1956, the district opened advertised bids on the project.

Bids from 9 contracting firms ranged from \$215,179 to \$354,578. The bids, reflecting a

recent steel price rise, greatly exceeded the district's cost expectations.

The directors' plan for financing the program was to sell bonds to pay for the project immediately and then set up a repayment plan over a period of years by increasing assessments to the water users. The Washington State Department of Conservation and Development had agreed to purchase up to \$200,000 worth of bonds. The bids so exceeded the money available that at first the directors were at a loss as to what to do.

They then decided to negotiate with the lowest bidder, the M. F. Castle Company of Spokane, Wash. An agreement was reached and



Fitting sections of the concrete siphon together before sealing the joints.

a 42-inch concrete cylinder pipe was selected for installation.

To help reduce the cost, two other concessions had to be made. They were: First, the irrigation district was to remove and dispose of the old siphon; and second, the existing inlet and outlet structures were to be used even though this meant sacrificing some flow efficiencies. Removing the old siphon with its 100 tons of scrap iron wasn't a small chore; however, the material salvaged help pay for the cost of removal. The final cost of the project amounted to \$199,759.01.

The installed 42-inch pipe is composed of a 12 gauge steel pipe liner with $\frac{3}{4}$ inch of spun



Excavation of the ditch for the Pine Creek concrete siphon.

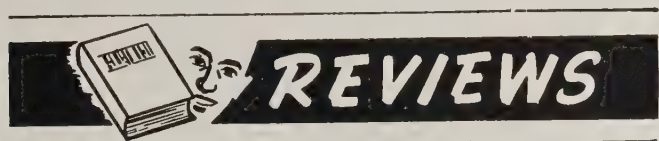
concrete on the interior, and with a $\frac{5}{16}$ inch steel wire wound spirally about the steel cylinder. The liner and wire is covered with a 1-inch covering of spun concrete on the outside. Each 32-foot section of pipe weighs approximately 5 tons. It has a life expectancy of 100 years.

Installation of the new siphon was started in February 1957, under the supervision of SCS engineers. This was none too soon as far as the old siphon was concerned. A final break in the old wood stave siphon had occurred the previous October when a hole 50 feet across, and 7 to 8 feet deep, was torn out by escaping water. Broken steel bands were picked up as far as 80 feet away from the break.

From the middle of February to the middle of April, the old siphon was removed and disposed of; the trench dug, pipe laid, backfill placed, and inspection completed.

The old siphon originally went over Pine Creek on a trestle. To eliminate the hazard of annual flood waters to the new pipe, however, it was placed underground all the way.

The final pipe section was laid on April 12, and water for irrigation was turned into the system on April 13, 1957. The worries of "no water—no crop" were discarded with the old wooden siphon.



TIMBER RESOURCES FOR AMERICA'S FUTURE. By the Forest Service. USDA Forest Resources Report No. 14. 713 pp. Illustrated. 1958. Washington, D. C.: U. S. Government Printing Office. \$7.00.

THIS is the most elaborate report of any of the timber appraisal reports made by the Forest Service. Doubtless, it is also the most complete of all resource appraisal reports and should serve as a model for future reports on other American resources.

This report and its interpretation is presented as a "State Of The Union" message on our national timber supplies by the Forest Service.

Several reasons for making this Timber Resources Review are listed. One of the most significant reasons is that the post World War II period appeared to mark a rapid acceleration in American forestry. Thousands of private forest owners showed a heightened interest in growing timber. There was fuller utilization of the timber harvest, and new gains were achieved in forest protection.

The impact of these and other changes in the national forestry effort pointed towards a new look at the timber situation.

One of the other changes which could have been listed for example is the demand for wood and the development of markets for wood. This made it profitable for private landowners to grow wood as a crop.

The post World War II decade will prove to be the period during which there has been a general public acceptance of the fact that both old growth and public timber have not been supplying the Nation's woodbox.

It is encouraging to have interpretations that point to the significance of privately owned land as the primary source of our future wood supplies. "The key to adequate timber supplies in the future lies with the 4.5 million farm and 'other' private holdings. Although they own mainly small tracts of forest land and their principal interests are not growing timber, in the aggregate, they control well over half the Nation's commercial timberland, and they must continue to supply a substantial portion of the raw materials for the forestry industry. Industrial and public ownerships alone do not have the capacity to sustain future timber demands."

This fact offers opportunities to private owners that will encourage them to use their resources—land, labor, and capital—to grow wood for America's wood-using industries.

Growing wood as a crop is now a business for many landowners. There is adequate historical evidence to create a great confidence among investors in wood-using industries that landowners can and will grow the raw materials needed by the industries. They have the land and will acquire the know-how necessary to grow the crops just as fast as they are given the necessary incentive—and not any faster. They have done it with other crops—quite adequately—even to excess. They can do it with wood.

Certainly this report should be available to all persons interested in forest industries, either in private or public programing of land uses, and in conservation use of the wood crops grown on our basic resource—the soil.

—T. B. PLAIR

ROCKS AND RAIN AND THE RAYS OF THE SUN. By William Fox. 90 pp. Illustrated. 1958. New York: Henry Z. Walck, Inc. \$3.00.

A beautifully illustrated book about the natural resources we enjoy but take for granted. The text gives an accurate and concise account of rocks and rain and the other natural resources affected by the sun's rays.

The author points out that it is good to know about our resources and then use them without waste. They are for our use, but also for those people who will come after us. It is a challenge to know more about all of our natural resources and how we are dependent on them.

This book should be especially good for elementary and junior high school age groups but will interest older readers.

—FAIR GRIFFIN

SOILS: An Introduction to Soils and Plant Growth. By Roy L. Donahue. 349 pp. Illustrated. 1958. Englewood Cliffs, N. J.: Prentice-Hall, Inc. \$6.75.

BOOKS on general soil science that are both balanced and simple are very scarce. Dr. Donahue has given us a good one. He sets out the main principles and examples of their practical application with an economy of words. Knowledge of chemistry beyond the meaning

of the chemical symbols is not required. In about 130 pages he deals simply and effectively with fundamental principles; 182 pages are devoted to soil management and conservation; and, the rest is used for glossary and index.

To keep the discussion balanced, he has had to make many difficult decisions. Although probably none of us would have given the same exact emphasis to the several aspects, he has done the job well in terms of the most important current ideas.

This book should be especially good for elementary text or as a reader for those needing a general review of the subject without extensive scientific preparation.

The text is unusually well-illustrated with photographs, simple charts, and drawings.

—C. E. KELLOGG

DOUBLE TROUBLE.—In the Vosges Mountains of France, topsoil is washed down to the valley each year. At the end of the growing season, the farmers get out their shovels, go down to the valley, put the soil into baskets, and then carry it up to the mountains on their backs, so it can be replaced!

Seems as if they're doing it the hard way. It's a whole lot easier to keep the soil where it belongs in the first place, by using the right soil conservation measures.

—*The Conservation Volunteer*

CONSERVATION IS FOR PEOPLE.—Conservation of soil and water, trees and grass, is meaningless unless it is done for people, to provide the things people need—food, clothing, building materials, and even recreation. Conservation will not succeed unless our people understand it.

—Ezra Taft Benson,
Secretary of Agriculture



**SEPTEMBER
1958**

Soil Conservation

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION

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★ THIS MONTH ★

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TOM DALE, Editor

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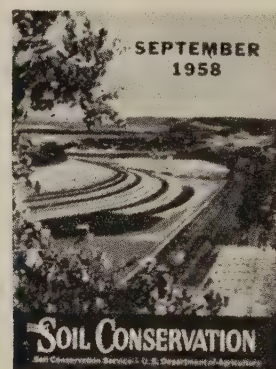
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FOREIGN SUBSCRIPTIONS.—A recent check shows that SOIL CONSERVATION Magazine has 382 paid subscriptions going to 73 foreign countries. India leads the list with 49 paid subscriptions. Other leaders include Canada with 32, Japan with 29, and the Union of South Africa with 28. The U. S. S. R. has 9 paid subscriptions, all of which go to government experiment stations, colleges, and libraries.

Some of the out-of-the-way places where people pay money to read this magazine include: Hong Kong with 3 subscriptions, the Fiji Islands with 2, and Mauritius with 1. Paid subscriptions have been increasing steadily for several years in foreign countries.

In addition to the paid subscriptions, about 340 free subscriptions are sent to foreign countries. Nearly all of these go to government departments of conservation or agriculture and to public libraries.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—Patterns of conservation farming on a fruit and grain farm in southeastern Minnesota.

Photo by W. H. Lathrop

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They Call Him "Humus Brown"

By BOB KANE

"SOIL building is fun, but it takes patience and determination to enjoy the fruits of your labor," according to John W. Brown, farmer-homesteader in the Black Canyon reclamation project at Caldwell, Idaho.

The Browns had their first look at the 90 acre farm that has since become their home early in 1951.

"This was new land," John said. "It had never felt the plow. The native sod, broken only by scattered patches of sagebrush, extended the length and breadth of the whole farm. My first look at the rolling hills with their gentle slopes reminded me of a peaceful challenge. As I stood there, half afraid and yet enthusiastic of what the future had in store for us on our first homestead, lines from Robert Lewis Stevenson's immortal poem, *Success* raced through my mind 'He has achieved success . . . Who has left the world better than he found it . . .'"

Today it is a real eye opener to cross the fields on the Brown farm, and walk and look and hear John's simple, but matter-of-fact, story of soil building; a story evidenced by the face of his entire farm. The sweat and toil demanded for a good start have paid satisfying dividends.

For example, the time required for each irrigation has been reduced by one-third, while the interval between irrigations has been more than doubled. Also the time required to meet the man-hour demands of the farm were reduced by one-third, and the over-all production on the farm has been more than doubled.

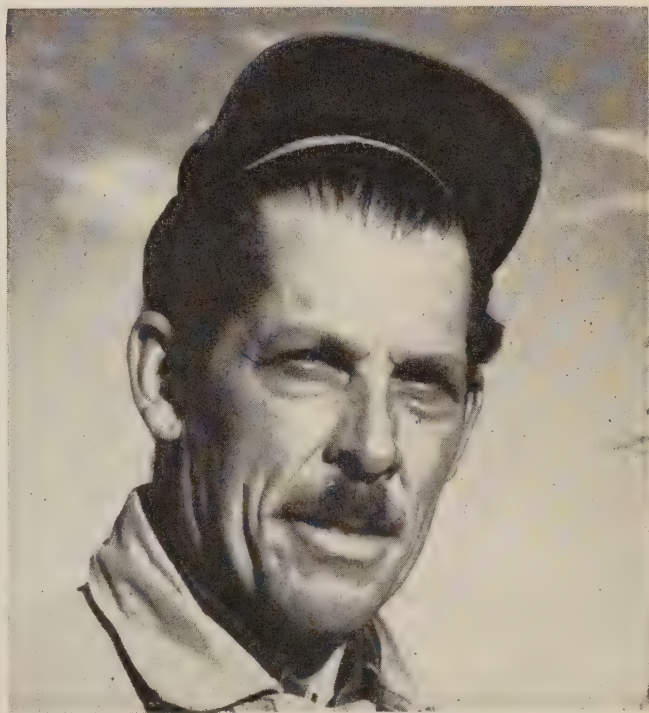
It's only appropriate to mention that this display of enthusiasm for something John really believes in and practices has not gone unnoticed by his friends and neighbors. In due respect, and justly so, John now answers in friendly

circles to the popular nickname "Humus Brown."

It was a big thrill for the Browns when the first land leveling equipment moved onto the farm. "The high places were cut as much as 6 feet in depth, while fills in the low areas were as much as nine feet deep in places. It seemed like there was nothing left on the farm but bright colored subsoil," John Brown commented.

"No man can know how fast we learned that first year on the farm, learning just how many problems we really had to work with. Those were big problems and many are still with us today."

From the start, John recognized the soil as his biggest problem. It was a burned-out desert soil nearly void of organic matter. When the soil was wet it was slick and bottomless; when



John W. Brown.

Notice:—The author is work unit conservationist, Soil Conservation Service, Caldwell, Idaho.



Plowing under the third growth of alfalfa as green manure on the Brown farm.

dry it was so tight that a shovel could scarcely scratch the surface.

The Browns were located inside the Canyon Soil Conservation District and requested assistance on their farm. Technicians from the Soil Conservation Service studied the problems and helped John organize his plans. Since John is a conservationist at heart he was already sold on modern conservation practices—with him it was only matter of selecting the practices adapted to his farm.

A soil survey was made on the Brown's farm and showed all the land to be class III and IV. The 90 acres extends lengthwise from north to south with a small lateral canal running the length of the farm and dividing the class III land on the east from the class IV land on the west.

Soil Conservation Service technicians helped John prepare a complete farm plan based on the ability of his soils to produce. Among other things, the plan called for a 3-year rotation on the class III land. This included alfalfa-grass hay for 2 years (the third crop of hay was plowed under for green manure on the second year) and row crops for 1 year. A 5-year rotation was planned for the class IV land and included alfalfa-grass hay for 3 years, small grain with red clover seeded in green manure for 1 year, and grain with a new seeding of alfalfa-grass hay the fifth year.

It was hard for the Browns to know where to start. A house, some livestock, and the

leveling had taken nearly all of their cash reserve except what would be needed for seed and fertilizer. The soil was all they had to work with and so that was where they decided to start.

The first crops were planned to provide green manure over as much of the farm as possible during the first season. In every grain crop John included a generous seeding of white blossom sweetclover, which was turned under in the early fall. Orchardgrass was seeded with alfalfa as a hay mixture to provide the soil-building qualities of the grass roots. Enough straw was baled to furnish bedding for the livestock during the winter and the rest was worked into the soil.

Slick spots are common in the Black Canyon and are characterized by "adobe" conditions combined with chemical problems to really make it tough.

The water intake rate of the soil was poor. "We turned from 4 to 5 gallons of water per minute down each corrugate," John explained, "and it seemed like every drop ran off the lower end of the field. We set the water on 700 foot runs for 72 hours, and sometimes longer, before enough water was taken into the soil to last until the next irrigation."

At the time, it seemed that the plan included all the essentials to see John's desires through to completion. During the second year of this plan, however, John recognized that one thing was lacking. On the slick spots, just where



A typical "slick spot" on the Brown farm that was rejuvenated by addition of large quantities of organic matter.



Stubble mulching on the farm of "Humus Brown."

organic matter was needed most, there was no plant growth. To correct this problem, John began to use industrial gypsum to neutralize the sodium carbonate present in the slick spots; and, dragged feed bunks onto these spots and fed steers and young heifers there over winter. John said, "This helped, but progress was too slow for the results wanted."

A more intensive soil-building program was needed to satisfy John's ambition. He talked soil building wherever he went and tried each new idea that seemed to offer an improvement over his soil building progress. "I discontinued using the plow except for plowing green manure crops and got a chisel-type tillage tool that I work from 12 to 14 inches deep," John explained. "This method mixes the crop residue with the soil much better than turning it under."

In addition to these practices, John continued to adopt other ideas. Each winter he purchased alfalfa and clover chaff at reasonable prices along with large quantities of wet straw that had been used to cover stacked hay. He also spread barnyard manure for his neighbors on 50-50 shares.

"I spread all this organic material on the worst spots of my fields, and still put a full application of barnyard manure from my own farm over the entire field," John said.

Along with these generous applications of organic matter, John likes to use a winter crop of rye and peas in a mixture for green manure whenever possible and follows it with a late-seeded crop such as corn or potatoes. Incidentally, he advised that very careful attention must be given to the application of commercial fertilizers with this type of a program.

John Brown has never allowed his enthusiasm for soil building to be dimmed, nor has he limited it to his own farm. In the fall of 1955, he was nominated and elected to the board of supervisors of the Canyon SCD. The following year he was elected chairman of the board and has since given added emphasis to the soil-building phase of the district program.

John's personal slogan is, "Let's make the Black Canyon blacker." Oh yes, and John still hopes to be one "... Who has left the world better than he found it ..." His 90 acres anyway.

A GRAND JURY COMMENDS.—The Pickens, S. C., grand jury completed its work on indictments and made its presentment. In the presentment, the jury commended the Pickens Soil Conservation District for the work done on the Twelve Mile Creek watershed, and for the project being planned on the Golden Creek watershed. The jury suggested that farmers concerned in the Golden Creek project continue the work they are doing in promoting the watershed protection project.

Watershed Associations

Group Action Influences What People Think and Do and Often Provides the "Spark" for Greater Conservation Accomplishments.

By J. W. STEVENSON

SINCE its beginning, the Soil Conservation Service has regarded watershed groups or organizations as logical units to work with in helping put soil- and water-conservation programs into operation on the land. In the early thirties, demonstration projects generally were established to include a watershed area. The first demonstration area in the United States, Coon Valley, Wis., was one of them.

As the modern conservation movement spread and demands for help in planning and applying conservation measures on farm and ranch land multiplied, it became apparent that watershed groups or associations often stimulated more farmers and ranchers to use improved methods and to apply them more rapidly.

In some cases, these units were groups of people, closely knit by friendship and tradition, and accustomed to working together. The members simply formed a loosely organized watershed group. Many of these eventually expanded and took on the more formal organization of a watershed association. They were usually rural in nature, although urban landowners and agricultural-minded business and professional people sometimes participated. Soil conservation district officials often encouraged such organizations to help start or speed up conservation work.

Today, we have the latest development in the watershed associations, which, in many places, help the local sponsoring organization plan and put into effect the watershed-protection and flood-prevention work authorized by Public Law 566. These associations include not only farmers and ranchers, but also city people, wildlife enthusiasts, business and professional people, local government representatives—any-

one interested in alleviating the flood and siltation damages in a watershed as well as stabilizing soil and water resources.

Observations made while working with watershed groups and associations the past two decades reveal some characteristics, which make such groups successful and shows the advantages of working with them.

Landowners, farmers, and ranchers resent "being told" how to manage their land. They are more likely to adopt new practices if they hear neighbors in their watershed talking about and approving them. This makes the ideas socially acceptable. People are even more influenced when others start using the newer methods. Patterns of life—or farming—can most easily be changed when they are group-formed and group-accepted.

Technicians and other representatives of government agencies must work to keep in the background. They can lend encouragement and provide information to the leaders of associations. But, nothing will stifle the true value and effectiveness of an association faster than a paid public official "taking over."

The leaders of an association may swing off on tangents at times. That is their privilege, however, and time sometimes proves them to be right. More important, the more leadership they assume the stronger their organization is likely to be in its activities.

Few things prime the pump of group enthusiasm more than good "publicity." Most of the successful associations have an appointed reporter to work with local newspapers and radio stations. In addition to creating enthusiasm and public support for community efforts, such an information program stimulates landowners and operators to develop and apply soil- and water-conservation plans on their land. Attendance at meetings is improved, and other watersheds become interested. Some associa-

Note:—This article was abstracted from a talk by J. W. Stevenson, work unit conservationist, Soil Conservation Service, Baraboo, Wis., Interagency Conference on Watershed Activities, Madison and Chippewa Falls, Wis., August 1957.

tions also publish their own newsletters for members.

The success or failure of a watershed association seems to depend directly upon its elected and appointed leadership. Size does not seem to make much difference. We have successful ones that have more than 400 farms and 57,000 acres and others that have only 35 farms and 6,800 acres. We have successful associations that meet twice a year, and some that meet regularly every month with special meetings as needed. The ideal seems to fall somewhere between these extremes with a picnic, tour, or field day during summer.

Good associations have goals to accomplish, projects to do, programs to work out. Aimless meetings for meetings' sake soon kill interest. Use of local talent, including musicals and plays, brings in new members and adds variety and interest.

The most successful watershed associations have been based on participation of entire families—dad, mother, and the kids. Today, many activities tend to split the family. Different people have said that being together is one of the things they like best about the meetings. Something of interest for the adults and for the youngsters is planned by many associations.

Projects give purpose to the organization. Some projects that Wisconsin associations have conducted successfully, follow:

The Narrows Creek Watershed staged a tree planting day. Farmers furnished tools. Each farmer teamed with a Kiwanis Club member to plant 5,000 trees and 40 rods of multiflora rose hedge. They put up 40 rods of fence to protect the area. Afterward they all had a family-style picnic. The townsfolk are still talking about this type of city-country relationship, and they have a continuing interest in watching the progress of the trees and the other conservation work.

The Plum Valley Watershed set up its own erosion test plots and silt-collection basins and posted signs for all to see. These plots were visited annually by the members to check the results, and the plots also were used by many other groups in the county.

Several watersheds including Plum Valley, Seeley, Dell, Hay, and Twin Creeks have developed parks and recreational facilities for their youth as well as soil conservation—another sign

of increased community pride.

Watershed people are playing important roles in field days of various kinds, giving generously of their time and equipment, and working actively on the promotion of the event.

Because these associations are well-organized and are going concerns, they have been able to grasp new opportunities as they developed. Many received special help when the Pittman-Robertson wildlife projects were set up. These watersheds planted more than 120,000 trees and shrubs in a single year and fenced many woodlots.

The Dell Creek Association appointed men to go down the road selling trees where they were needed. As a result, they put in more than a quarter of a million trees in a single year, many more than planted before in the history of this area.

Plum Valley raises 300 to 400 pheasants each year to restock an area, where before such birds had been almost nonexistent. Incidentally, it won a national award and recognition for its work.

The oldest of the watershed associations, Plum Valley, organized in 1947, has 75 percent of its farmers as cooperators with the soil conservation district, as compared to about 40 percent for the district as a whole. This same area started without any 4-H or home-makers clubs, and now has active clubs of both kinds. The establishment of conservation practices on the land runs 83 percent ahead of the rest of the soil conservation district.

In another watershed, which has operated only 2 years in an area that had been tough to crack for years, 15 percent of all the conservation practices laid out for the district, were done. Yet, it has only 3 percent of the county farms.

Other agencies, particularly the Wisconsin Conservation Department, have found the watershed associations to their liking. They can work with the locally established, responsible groups. For example, the Department of Conservation is purchasing and leasing land along a trout stream, putting in stream improvement structures, planting trees, and stabilizing banks. Farmers are starting to conserve the soils that contribute floods and silt to the stream.

The philosophy of a farmer who lives in a watershed is found in this quotation from an article by Harold Kruse, farmer and editor of the Narrows Creek Watershed Association paper, the *Narrows Creek Ripple*: "In developing a well-rounded conservation program—soil, water, woodlands, and wildlife—we must not forget the fifth factor—beauty. Wisconsin has its State parks, preserved and managed exclusively for their scenic and recreational values, but these are merely isolated islands of beauty in the overall landscape. The true beauty of our State lies in its farms and woodlands, its lakes, streams, and marshes. It is difficult to picture a more pleasing scene than that presented by a healthy, prosperous and well-managed Wisconsin farming community, with its attractive farmsteads, abundant crops, and healthy livestock; its contoured fields and well-kept woodlands, fencerows, ponds, and streams abounding in birds, mammals, wildflowers, and aquatic life.

"Such a scene also includes healthy and happy people; our most important resource. It is the goal toward which we in the watershed associations work."

Cooperation On A Small Watershed

By RAYMOND C. KUBIE

How often have we heard the remark, "Soil and water conservation farming is all right, but I'm now too old to change my way of farming. That's for the younger generation."

Yes, it is all right for the younger generation and for 82-year-young, Joe Lesoing who lives 1½ miles south of Sprague, Nebr. Joe's farm is in the heart of the Upper-Salt watershed in sub-watershed No. 2. (This watershed, like many others, is broken down into a number of smaller watersheds.)

Watershed conservation, for very practical reasons, can best be developed and carried out on a sub-watershed basis. Usually only a few landowners are involved in a small sub-water-

shed and they can meet conveniently, receive the information, and make decisions that are necessary. For a watershed protection project to be successful, it requires the cooperation of everyone within its boundaries.

As part of the Upper-Salt watershed program, a floodwater-retarding structure was planned for the lower part of the drainageway that passed through Joe's farm. But before this structure or dam could be built there were many other things that needed doing. Basic to the watershed program, was the establishment of vegetative cover and other land treatment measures in the drainage area above the dam. This included the establishment of grass waterways, the construction of terraces and grade stabilization structures, the use of soil conserving crop rotations, improved pasture management, farmstead windbreak plantings, wildlife area improvement, and roadside erosion control.

One night early in the spring of 1954, Joe invited to his home all of the 12 farmers who farm or own land within the sub-watershed. At this group meeting an overall soil- and water-conservation plan was outlined for the sub-watershed area by Soil Conservation Service technicians. Many questions were asked and answers provided so that all would understand what this was all about. The idea of conservation "watershed-wide" appealed to the group. They decided to plan and apply the



Joe Lesoing in a gully at the site where the floodwater-detention dam was built.

Note:—The author is assistant area conservationist, Soil Conservation Service, Lincoln, Nebr.



Floodwater-retarding dam on the Lesoing farm with surrounding area covered by grass and trees.

needed conservation measures as rapidly as possible.

When the dust had settled by late fall, there were 37 miles of new terraces, 35 acres of waterways, 2 farm ponds, and 1 gully control structure installed within this sub-watershed. Other soil management practices were adopted, while grass and legumes were planted on the steeper land. Soil and water conservation was not new to this group since many of the farmers had previously applied some conservation practices. But in this case they had a goal in mind and set about accomplishing it in a more rapid manner.

Meanwhile, down on Joe's farm a contractor with several pieces of earth moving equipment was constructing a 29,000 cubic yard earth dam with 102 feet of 18-inch reinforced concrete pipe through it. The dam is 32 feet high and 750 feet long. The reservoir will temporarily store 173 acre-feet of water which, when released slowly through the 18-inch pipe, will require from 4 to 5 days to drain. This leaves a 4-acre permanent pool from 6 to 9 feet deep.

When migratory fowl head back north in the spring, one of the stopping places is on Joe's pond—at least for some of them. On occasion a few will remain until later on in the summer.

Boy Scout troops and patrols from Lincoln use the pond and adjacent grounds for overnight outings. Neighbor boys, as well as adults, enjoy many hours of recreation at Joe's. This partially spring fed pond is in a natural setting

with trees bordering on the north and east and a well-grassed slope with some trees on the south. Winds do little to ruffle the quiet water surface. Just to sit on the banks and gaze at the cool, placid waters and nature's surroundings is refreshing and relaxing for a tired man.

This concept of watershed conservation is not new in Nebraska. Our earliest soil and water conservation districts were established on a watershed basis. But, Mr. Lesoing and his neighbors, as many other watershed groups in the Lancaster Soil and Water Conservation District, have established a pattern and are doing much to further the idea of providing enduring benefit to their own and future generations.

DISTRICT PROFILE	H. W. ARRINGTON OF FLORIDA
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H. W. Arrington, chairman of the board of supervisors of the Levy Soil Conservation District has the reputation of being one of the best supervisors in Florida. The Levy District was organized in 1948, and Mr. Arrington has been elected chairman of the board every year but one.

In the 10 years he has been active in district work, he has never missed a meeting of the local board, never missed an area meeting, and missed only one State meeting. Besides being chairman of the local board he is also a director of the Florida Association of District Supervisors.

There are many district accomplishments which justify calling him an active, hardworking supervisor.

Levy District had an essay contest for school children 7 years ago—one of the first in the State. It ran for 3 years, and was dropped only when the State association started a statewide speaking contest. The Levy District participates in the speaking contest and provided the first winner.

Levy District won the Goodyear contest 2 years ago.

Each year, Levy holds an Accomplishment Day on April 1, with an average attendance of about 500 persons.

At each monthly meeting, Mr. Arrington arranges to have some particular group of people present, such as bankers, teachers, or ministers, as guests.

Levy District gets a \$500 appropriation from the county commissioners each year to help run the district.

It was largely through Mr. Arrington's efforts that the Levy District was organized.

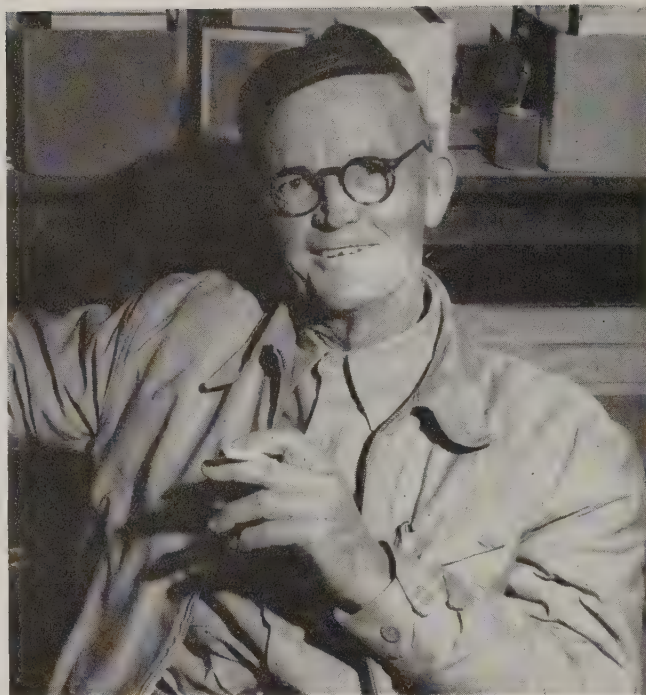
"I was born in Levy County in 1885," said Mr. Arrington, "and in the past 73 years I've seen the land grow poorer and poorer. Levy is a sandy county and one of our problems is wind erosion. Many's the time I've been driving up the road to Trenton and couldn't see 100 feet ahead of me, the air was so full of blowing topsoil."

Besides wind erosion there was leaching and a considerable amount of water erosion, even though much of the land appears to be level.

All of this had combined to bring about a condition that was being reflected in damaged land, lower yields, and a general deterioration in farming in Levy County.

Today, the situation that existed 10 years ago has changed—dramatically and profitably.

"Ten years ago a little lupine, and a little pangola and Bahiagrass, was being planted, but there wasn't a wind strip in the whole



H. W. Arrington.

county," Mr. Arrington told me.

Today there are several thousand acres of pangola and Bahiagrass and several thousand acres of wind stripping.

"Wind stripping has meant thousands of dollars to Levy County watermelon growers alone," says Mr. Arrington. "Levy is the biggest shipping point in Florida for watermelons. And wind erosion will ruin a watermelon crop. Blowing sand will damage the young vines severely. It will whip the growing vines and knock off the blossoms thus resulting in fewer melons. And finally, it will scar the melons so that many will be graded No. 2's regardless of size.

"We still have some wind erosion but not anything like it used to be."

Grass-based rotations are being pushed vigorously by the supervisors.

Tree planting is getting to be a big item in Levy. Most of the trees being planted are slash pines and they are set out along fence rows, thus being made to serve as windbreaks.

"Where farmers have worked with the district in applying recommended conservation practices, production has been built up as much as 50 percent," he told me.

Mr. Arrington was born and brought up on

a farm and has been a farmer all his life. He still supervises a 160-acre farm belonging to his sister, and runs a few cattle, but as he pointed out, when you get to be 73 years old, you have to begin taking it a little easier.

But, if Mr. Arrington is not actively engaged in farming any longer he still devotes a lot of time to running the district and serving on many agricultural committees and boards.

He is vice president and a director of the Levy County State Bank, and he is also an honorary member of the Florida Sheriffs Association, an organization that works with delinquent youth of the State.

In 1956, he won recognition from the Florida chapter of the Soil Conservation Society of America for making the greatest contribution to soil and water conservation in the State.

He has been awarded so many certificates and plaques that he is hard put to find a place to display them all.

I came away from my interview with Mr. Arrington with the definite impression of having met and talked with Clarence Buddington Kelland's fictional character "Scattergood Baines." From his seat on the steps of his store there's little that escapes his attention.

He doesn't have many customers now, since it's easy to jump in the family auto and drive up the road to the supermarket, but people still go by the store to talk with him and get his advice on all sorts of matters. And, as he sits there and dispenses words of wisdom, you may be sure that he never misses an opportunity to talk about the advantages of conservation farming and how it contributes financially, socially, and spiritually to everyone in the county.

H. W. Arrington deserves everything that is said about him by his friends and neighbors in Levy County for the many fine things he has done for the county. But after talking with him for the better part of an afternoon, I am confident that no accolade would please him more than to be remembered as an active, hardworking district supervisor, who spent the last years of his life working assiduously and devotedly for the physical improvement of the land and the economic improvement of the people who farm the land in Levy County.

—LEON J. SISK

From "Roughneck" To Rancher

*A Former Oilfield Worker Owns
and Operates a 14,000 Acre Ranch
the Conservation Way.*

By ALBERT P. THATCHER

ROY SIMS raises Hereford cattle—and good ones, too. Roy came to the Rock Creek country while in his teens and spent most of his younger manhood working as a "roughneck" and driller's assistant in the oil fields near there. His folks once owned a ranch in the Little Snake River Valley near Dixon, Wyo. With this background, Roy always yearned to own a ranch of his own some day. His dreams have been realized. Today, he and his wife, Opal, own a 14,000 acre ranch on Rock Creek near McFadden, Wyo.

The ranch consists of about 1,100 acres of irrigated meadowland and 12,900 acres of rangeland. Roy runs about 400 breeding cows with about 1 bull to every 35 cows. The cows drop their calves around the middle of April, and the calves go to market about October 15. Last year his steer calves averaged 377 pounds, which is somewhat below his par.

Severe drought in this part of the country curtailed the native-grass production and less-

Note:—The author is range conservationist, Soil Conservation Service, Laramie, Wyo.



Roy Sims repairing one of his cross fences.

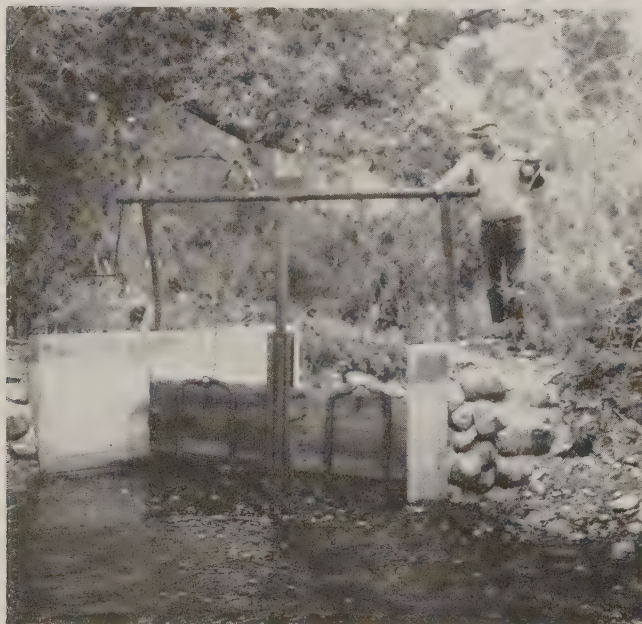
ened the amount of irrigation water available the past 4 or 5 years. Even with these severe growing conditions, 377-pound calves at 6 months in the High Plains country is pretty good.

The quality of his calves can be attested by the fact that the same feeders from Toledo, Ohio, have contracted his calves the last 3 years. He has received notice that these same men want to obtain them again this year. These men wrote that the last batch of calves he shipped them weighed 1,000 pounds by September 1.

Roy attributes the thriftiness of his cattle not only to good quality of breeding, but also to the good care he gives his cows. He sees that they have plenty of feed while on the native rangeland during the grazing season and on the meadows during the winter and early spring.

Sims realizes that proper management is necessary to maintain good quality native forage on his rangeland. He manages his pastures so that the same field does not receive early grazing year after year. He believes in preventing damage to the native grasses by not grazing too close. He says, "Any time you allow livestock to take more than about 50 percent of the grass each year you hurt yourself."

Roy will tell you that plenty of watering



Opening the headgate from Rock Creek to the main irrigation canal on the Sims ranch.



Sims inspecting one of the concrete control structures used in his irrigation system.

locations are necessary to obtain uniform distribution of the livestock, thus preventing overgrazing in localized areas. On his rangeland there is at least one watering location in every section; and, on some sections as many as three watering places have been developed.

He has both stockwater dams and wells, but prefers the dams "2 to 1" because they require less upkeep. He believes in cross fencing his pasture to better control distribution of his cattle. He has built $3\frac{3}{4}$ miles of cross fences in the last 3 years.

Three years ago Roy started doing something about the improvement of his haylands. The common practice in this country has been to turn the water on the meadows early in the spring and allow it to remain until time to dry the soil prior to haying.

"The first thing a rancher must do if he intends to improve his meadows is to obtain water control," Roy says. Being an action believer, and not just a "talking" believer, he set out to build concrete water-control structures throughout the irrigated portion of his ranch.

Roy has started a reseeding and fertilizing program on his hayland. He says, "My idea is to plow these meadows, sow them to oats and peas for 1 or 2 years, and then seed them to a good quality hay mixture."

He is presently cooperating with the Agriculture Research Service in some fertilizer- and water-control studies on some old timothy and

alsike clover stands. The yields obtained from these studies are almost hard to believe. He is convinced that commercial fertilizers, when properly used, mean "money well spent."

He has cleared and leveled some willow land along Rock Creek, and while I was visiting him he showed me some moving pictures taken while harvesting the first crop of oats and peas from this land. The height of the oats and peas were as tall as Mrs. Sims was as she sat upon the tractor. What is most outstanding to the observer is that this land was yielding little usable forage prior to being cleared.

In the process of developing his ranch, Roy has sought assistance from every available source, including the Agricultural Conservation Program and Extension Service. He asked

assistance from the Laramie Rivers Soil Conservation District in 1953. He has developed a complete conservation plan for his ranch through help of Soil Conservation Service technicians.

Roy Sims also is an inventor. He has built a post hole digger that is something to behold, especially when in action. By the speed with which he can drill post holes, you can see why fence building is not much of a chore around the Sims ranch. He has also constructed an elevator-operated cattle dipping vat, which is the envy of his neighbors. His handiness with machinery is undoubtedly a carryover from his days as an oilfield worker. His adeptness with machinery is evidenced by an almost continuous demand for his services from his neighbors.

A Conservation Plan Involves The Whole Farm Business

No. 37

This is the thirty-seventh of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By ROSS V. BAUMANN

THE last 10 years have been a good period for the adoption of conservation farming. Prices of farm commodities and farm incomes were relatively high. The weather was favorable much of the time. Farmers who adopted conservation systems were in good position to withstand the drop in net farm income that frequently occurs in the first few years after adoption of a conservation plan.

Because of the favorable weather, farmers obtained good stands of pasture and hay. Beef cattle prices were more favorable than hog prices, and numbers of cattle were increased to consume the extra forage. The relatively good market for forages, through cattle, favored rotations that included higher proportions of forages.

The continued upward trend in farm costs, as prices of farm products turned downward from World War II levels, encouraged the use of new farming practices as one way of meeting the cost-price squeeze. Farmers were interested in trying newer techniques, even though the potential returns from some of them might not be immediate.

Most farmers who have adopted conservation plans recognize that overall farm planning for conservation is necessary if the practices that control erosion are to be profitable. Also they recognize the need for additional investment in cattle, for example, to utilize the forage in conservation rotations.

Note:—The author is agricultural economist, farm economics division, Agricultural Research Service, Ames, Iowa.

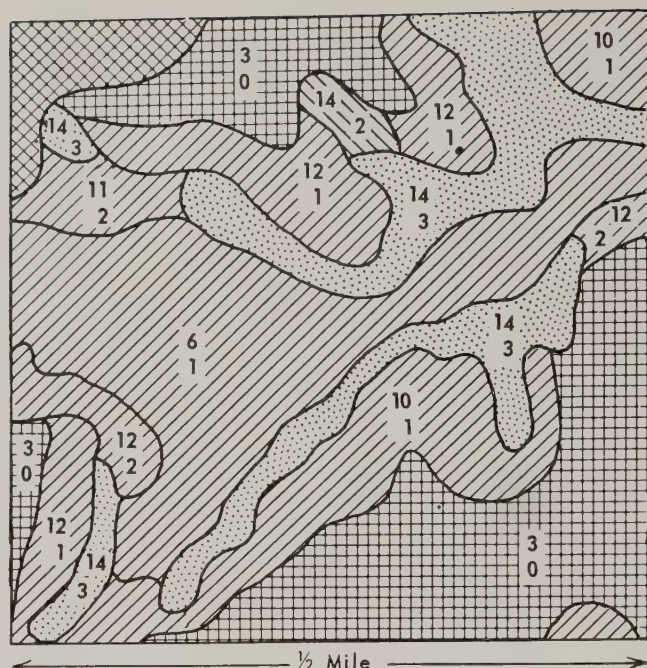
It is therefore important that public agencies such as the Soil Conservation Service and the Agricultural Conservation Program Service provide farmers with complete information, including changes required in enterprises and practices, capital needed, and probable returns from a conservation system of farming. There are waterways to establish, terraces to construct, and rotations to follow. In addition, the rest of the farm business must be altered to make the best use of the conservation system. The changes associated with land conservation measures often require more capital investment than the measures themselves. A certain amount of income must be foregone while these changes are progressing. Conservationists need to recognize the impacts of proposed conservation plans on the farm business as a whole.

A farm typical of many in the highly productive hilly areas of western Iowa was chosen for study to show the changes in farm organization that need to be made in adjusting to a conservation system of farming. The farm is just above the Missouri River bluffs in Shelby County where slopes are relatively steep. The major upland soils are members of the Ida and Monona series, which have been formed from loessial materials. Gullies form quickly even with moderate rainfall. But the land is productive and responds well to good management.

As outlined on the soil map, a broad ridge of Monona silt loam crosses the farm diagonally from west to east. North and south of this ridge are areas of steeply sloping Ida silt loam. In the northwest and southeast corners of the farm are areas of more level Napier and Hornick silt loams.

The annual cropping system, before conservation planning, included about 62 acres of corn, 53 acres of oats, and 41 acres of hay and pasture. Erosion had been severe on the Ida slopes. But the operator had been alert to keep the small gullies filled by working earth in them as they developed. The soil loss was estimated to be about 27 tons per acre in 1956.

By use of terracing, contouring, and improved rotations, the farmer can reduce soil erosion to about 5 tons per acre. A conservation crop rotation should include 60 acres of corn, 40



Soil map of the Shelby County, Iowa, farm used for study. The upper figure in each plot indicates the percent of slope; the lower figure indicates the degree of erosion.

SOIL LEGEND

	Ida silt loam
	Monona silt loam
	Shelby silt loam
	Harnick silt loam
	Castana Napier silt loam

EROSION

0	----	None
1	----	Slight
2	----	Moderate
3	----	Severe

acres of oats, and 56 acres of hay and pasture. The acreage of each crop in the rotation would vary from year to year because of the differences in area of the several classes of land. Terraces should be put on the ridge shoulders. About a mile and a half of terraces would be needed. The Napier and Hornick soils would be farmed "heavier" (more grain), and the steep Ida soils, farmed "lighter" (more forages) than has been true in recent years.

More hay and pasture would be available under this system and more beef could be produced. The present organization includes about 150 hogs, 5 milk cows, and 7 steers. Assuming that the farmer prefers not to milk any more cows, we have budgeted his livestock program to include more steers, which are bought in the fall, wintered, and fed on

pasture. But as he works into the plan he will soon be able to support 18 to 20 head and to maintain his present hog enterprise. The numbers will fluctuate from year to year along with the feed produced annually.

The operator could adopt the conservation system and maintain it with his present labor. The system would require some additional investment in livestock, buildings and equipment, fertilizer, and terracing. The terracing could be established for about \$320 (\$4 per 100 feet of terrace) with an additional investment of about \$25 for seeding watercourses.

The annual changes in farm organization for 10 years were estimated. The progressive changes are a result of improvements in organization associated with the conservation measures and the use of fertilizer. The increases in income are a result of the combination of conservation and other productive practices and the reorganization of the whole farm business that is associated with the conservation measures.

As productivity builds up, more feed—both grain and forage—becomes available. The number of steers can be increased gradually from 7 to 21 over a 10 year period, while hog numbers are maintained near the present level. The increase in productivity is due largely to the use of fertilizer and a better crop rotation. Net farm income would increase accordingly, from about \$5,500 to \$7,000. Heavy applications of fertilizer, particularly in the first few years of a conservation program, help to overcome the drop in net farm income that ordinarily occurs.

As projected in the conservation plan, the new crop rotation, terracing, contouring, and seeded waterways would be established the first year. Seven steers would be fed, and 154 pigs would be raised. By the fifth year, the number of steers could be increased to 12, and 7 more could be added by the sixth year. By the tenth year, 21 steers could be fed along with the hogs and milk cows.

These changes require additional capital for the investment in steers, a hog house, feed bunks, and an open shed. The first investment would be for terraces, seeding of waterways, and fertilizer. To increase hog numbers from 154 to 166 by the end of the fifth year, addi-

tional housing and equipment would be needed. The investment in housing and equipment would be necessary by the third year when feed would be available for part of the expansion. The operator might decide not to invest in additional housing and equipment for hogs if he believed that he would not use it beyond the 10-year adjustment period. Instead, he would sell or store the grain for future use.

By the fifth year, additional housing and equipment would be needed for steer feeding. This would amount to approximately \$1,050 if he bought a metal building, or if he used pole-type construction and assembled the shed himself. Otherwise, it would cost about \$200 more. To these investments would be added the annual cost of fertilizer and the cost of the additional steers needed to use the increased production of forage.

The first year, the additional investments would amount to \$674. By the 10th year, they would accumulate to \$3,714. Interest at 6 percent would be \$223 for the 10th year.

The investment in conservation and associated enterprises would be quite profitable. The average annual increase in net income would be about \$1,500 by the 10th year. This would compensate the operator adequately for the greater interest cost and the expense of the extra labor.

However, not all farms are as productive as this example farm, on which a conservation system could be established with little difficulty. More terracing and hence a relatively larger investment would be needed on some farms.

The land in the farm, the capital resources, and the labor or human resources are all involved in the development and adoption of a conservation system of farming. They should be considered as functioning simultaneously in the farm plan for each farm.

WATER FOR EVERYONE.—If we are to continue to have water for everyone, rural and urban people must join in managing and using the water resources in each watershed.

—D. A. WILLIAMS

"The Wonder Of Water"

Third Graders Use SCSA Booklet as a Text and Reference in Their Study of Water.

By JOSEPH SACCO

THE Soil Conservation Society of America pamphlet, "The Wonder of Water" scored heavily with third-graders at Oaklyn School, Sunbury, Pa. Their teacher, Mrs. Louise Evans, reported on the results to directors of the Northumberland County Soil Conservation District, who had furnished her copies of this popular, "comic-book" style publication.

Children used the booklet as a key reference in a thorough study of water for daily living, for plants and animals, for transportation, for pleasure, and for beauty. And also, as a potential menace when uncontrolled.

Note:—The author is work unit conservationist, Soil Conservation Service, Sunbury, Pa.

Inspired by the booklet, the youngsters developed projects in sanitation, weather, water-supply systems, drainage designs, and watersheds. They assembled a scrapbook, including photos, that showed how diversion terraces and other conservation practices put water "into harness."

Led by Mrs. Evans, they conducted many simple experiments on the mysteries of water, such as comparing fresh and dehydrated fruit and vegetables, measuring the moisture in melted snow, and noting condensation on cold windowpanes.

Highlight of the third-graders' water study was creation of large multicolored charts that showed what happens to precipitation, with and without soil conservation measures applied to the land.

Then the children took a close look at soil and water progress in their own neighborhood. Mrs. Evans reported they were greatly impressed by the Stone Valley Watershed protection project, 15 miles from Sunbury.

Mrs. Evans is one of several teachers to receive classroom copies of "The Wonder of Water" from the Northumberland SCD directors.



Third grade class of the Oaklyn Public School study "The Wonder of Water" under the supervision of Mrs. John Evans.

A Unique Conservation Exhibit

By PHILLIP J. TICHENOR

A STEADY rain shower on terraced and stripcropped land and over grassed meadows and waterways is seen by persons who view a unique soil- and water-conservation exhibit built recently in Minnesota.

The scale-model display was made to show how proper conservation practices help farmers save both soil and water on rolling land. It was constructed by Harlie Larson, Extension Soil Conservation agent at Caledonia, in Houston County, aided by local farmers and members of the Root River Soil Conservation District.

The exhibit is mounted on an 11- by 4-foot table. On the table itself there is a 3 dimensional field scene, with cropping patterns represented by colored terry cloth, put together in such a way that all cropping is on the contour. As the rain falls, the person who is viewing the exhibit can see how terraces carry the water to a "grassed waterway" which in turn carries the runoff to a pond below.

A pair of screens in the "sky" overhead distribute water from a perforated plastic pipe in such a way that actual rain seems to be falling. In the center of the display a grassed waterway leads to a farm pond and the "creek." This creek carries the over-flow water away from the pond to the back of the display.

Larson shaped the topography with sawdust, covered it with plastic to keep it dry, and put the terry cloth over the plastic. This makes it easy to dismantle and transport the exhibit.

Water for the rainfall is pumped from a small tub in back of the exhibit and is sprayed from the perforated plastic pipe on the overhead screens. The water from the creek runs back into the tub and is used over again.

This exhibit was displayed at the 1957 Houston County Fair, and at the National Association of Soil Conservation Districts convention

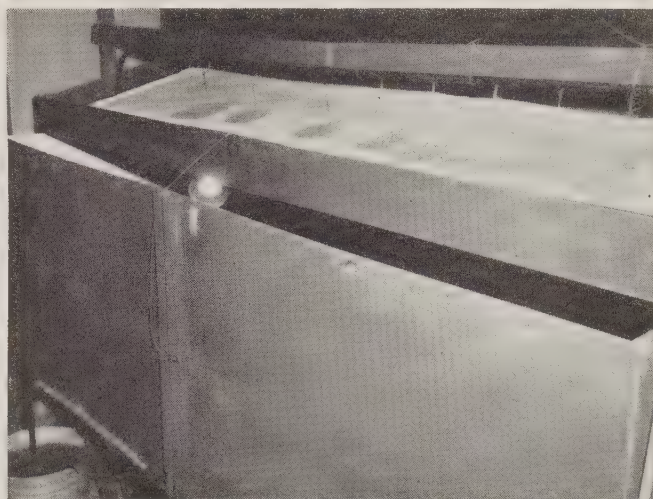


Harlie Larson explaining his "rain in action" exhibit.

early in 1958 in Minneapolis.

Larson is one of several county extension, soil conservation workers in Minnesota. These men concentrate on educational aspects of conservation and work in close cooperation with soil conservation districts and SCS personnel.

Part of the construction cost of the exhibit was paid by the Root River Soil Conservation District, and part was paid by the Minnesota Association of Soil Conservation Districts. Henry Haugland, Spring Grove, Minn., painted the scenery for the background—free of charge.



Water pumped from the tub, lower left, is released through perforations in the plastic pipe (above), and is dispersed by the fine mesh screen. A second screen, a few inches below, further disperses the water so that it falls on the fields as a fine mist.

Note:—The author is information specialist, Extension Service, University of Minnesota, St. Paul, Minn.

A Conservation Camporee

Boy Scouts Get a Three Day Short Course on Conservation on a Sportsmen's Association Farm.

By DAVID A. BENNETT

CONSERVATION recently took on real meaning for more than 400 Boy Scouts and their leaders in New Hampshire's Spaulding-Bay District. They will long remember the things they learned and did at their 3-day Camporee in 1958. So, too, will members of the Major Waldron Sportsmen's Association, who were the hosts on their 110-acre field and woodland tract in Barrington, N. H.

Conservation was not new to the members of this association—they had a conservation committee. They already were cooperators with the Strafford County Soil Conservation District, and they had a coordinated conservation plan. A lot of the conservation work, though, was still in the planning stage. The Scouts—well, they had the interest, the desire,

and the enthusiasm that only boys at that age can muster. The result was a real bang-up conservation good turn.

Naturally enough, all of this didn't just happen. Boy Scout executives, association members, and technicians from just about every conservation agency—local, State and Federal—all pitched in and worked hard to make it a reality. Everyone agreed it was well worth the effort.

The program was in two parts: first, to teach the Scouts as much about conservation as possible, and second, to let them actively take part in applying their newly-learned arts.

Hugh C. Tuttle, director for the National Association of Soil Conservation Districts, got the program off to a fast start with his opening address. He set the stage by stressing the importance of wise land use. The importance of

Note:—The author is conservation aid, Soil Conservation Service, Rochester, N. H.



Hugh C. Tuttle, director, National Association of Soil Conservation Districts, talks about conservation to Boy Scouts.

the conservation plan developed by the sportsmen's association was brought out—he stressed how the woodland, cropland, and wildlife areas all fitted together into one master plan.

The educational part of the program was the "Conservation Trail." It consisted of 12 stations set up throughout the association's fields and wooded areas. Each station was manned by a specialist in some field of conservation. Here the boys learned first-hand about conservation and its importance to sportsmen.

The Scouts got a close look at a soil profile dug in a well-drained site; they learned how a soil scientist uses an auger, mattock, and shovel; and, they studied the soils and capability map of the association's property. This was followed by two more stations on soil and water conservation. Demonstrations were given on how soil is washed away when rain falls on unprotected soil and how this is stopped by good sod cover. The importance of soil and water in our everyday living was stressed. The conservation plan was used to illustrate how everything tied together.

The importance of trees and shrubs got plenty of attention. Foresters taught the boys how young seedlings should be planted. They followed this up with demonstrations on how to prune and thin, and how to get maximum use of a tree after it has been cut. Finally they discussed and demonstrated how to use forest fire-fighting tools.

The association's property includes a trout stream. Fish and game technicians found plenty of Scout interest in methods used to improve stream fishing. Scouts were shown how log deflectors and stone-detention structures can be built with readily available material. They learned how good soil and forest cover helped to protect and improve the stream. Here again the complete plan was stressed.

Other stations included such wildlife aspects as development of odd areas for migratory birds, animal pest control, and overall wildlife area improvement.

At the final station, State conservation officers talked to the Scouts about courtesy to landowners and landowner relations. They pointed out that poor sportsmanship was causing more and more land to be posted. To undo some of the previous wrongs would call for



SCS soil scientist explains soil profile to Boy Scouts.

visiting with the landowner, taking an interest in his conservation plans, and above all respecting his property.

Enthusiasm for the second half of the program ran just as high as for the first half. In practically no time at all the Scouts had shovels flying and multiflora rose hedges planted. They thinned pine woodlots and pruned crop trees.

The Scouts surveyed three farm pond sites. There were plenty of instrument men and the dumpy levels really got a workout. One of the most popular sites was at the trout stream. Everything proceeded normally for a while and the log deflector took shape. Then most of the Scouts had a swim.



Scout group planting wildlife food plot on the Major Waldron sportsmen's farm.

Conservation was the main theme of course, but all of the other experiences of scouting were there—the troop campfires, outdoor cooking, and fishing in a well-stocked pond.

Everyone agreed the Scouts took a long step toward becoming conservationists, and the association's property was greatly improved by the actual conservation put on the land. The Camporee also provided the opportunity for just about every local, State, and Federal agency concerned with conservation to join hands with Scouts in "A Good Turn For Conservation."

Conservation Award Winner

Carl E. Haischer, SCS work unit conservationist at St. Mary's, W. Va., has been announced the winner of \$500 and a bronze plaque in the American Motors Conservation Awards program.

Haischer was selected to receive one of the 10 annual awards for professional conservationists for his work in promoting sound land use, particularly the raising of trees as a cash crop.

Formal presentation of the award is set for the national meeting of the Soil Conservation Society of America in October, at Ashville, N. C.

In addition to the land use planning and tree planting programs pushed by Haischer, he has written a weekly column promoting sound conservation practices for several weekly and daily newspapers since 1946.

The nine other professional conservationists who received awards similar to that of Haischer, are: Robert R. Bowers, Charleston, W. Va., of the West Virginia Conservation Commission; Robert Cooney, Helena, Mont., wildlife biologist with the Montana Fish and Game Department; L. E. Crawford, Lawton, Okla., retired enforcement officer with the Oklahoma Department of Wildlife Conservation; Guy M. Brandborg, Hamilton, Mont., retired National Forest supervisor; George Fell, Washington, D. C., executive director of Nature Conservancy; Paul Gil-

bert, Hot Sulphur Springs, Colo, wildlife biologist with the Colorado Game and Fish Department; Daniel L. Leedy, Silver Spring, Md., chief of the division of wildlife research in the Fish and Wildlife Service; George W. McCullough, Minneapolis, Minn; and Henry W. Moesch, Indianapolis, Ind., administrative assistant to the director of the Indiana Conservation Department.

The ten non-professional conservationists who received a bronze plaque, but no cash award, are: John H. Bailey, Johnson City, Tenn., a biology professor at East Tennessee State College; John Bain, industrial engineer of Palmyra, N. Y.; Theodore O. Hegseth, farmer of Carlyle, Minn.; Kenneth McLeod, Jr., time and motion analyst of Klamath Falls, Ore; L. L. Males, bank president and farmer of Cheyenne, Okla.; Marcus Nalley, businessman of Tacoma, Wash.; Paul J. Olsen, school principal of Madison, Wis.; William Pritchard, businessman and scoutmaster of Lake Leelanau, Mich.; James Shaeffer, dentist of Parker, S. Dak.; and Mrs. Marion T. Weatherford, housewife of Arlington, Ore.



Carl E. Haischer.

DISTRICT PROFILE

CHARLES GREENBACKER of CONNECTICUT

CHARLES GREENBACKER has been carrying the torch for soil and water conservation for many years. With crusading spirit, Greenbacker has been getting around to all the State's soil conservation district meetings. He has been transmitting the knowledge and the enthusiasm he picked up at the 1958 convention of the National Association of Soil Conservation Districts in Minneapolis. He figures that's part of his new job as president of the Connecticut Association of Soil Conservation District Supervisors.

Greenbacker has been closely identified with soil conservation districts since January 1951. That's when he became a cooperator with the New Haven County Soil Conservation District. He signed a district agreement to apply a coordinated soil conservation plan to the 350-acre dairy farm he owns and operates with his two brothers at Meriden, Conn. A conservationist at heart, it wasn't long before he was carrying the soil conservation message to others, within the district and beyond its borders.

Because of his active interest in conservation, Greenbacker was made a district supervisor in 1953. The next year he was elected chairman of the board of supervisors. Now he's board secretary.

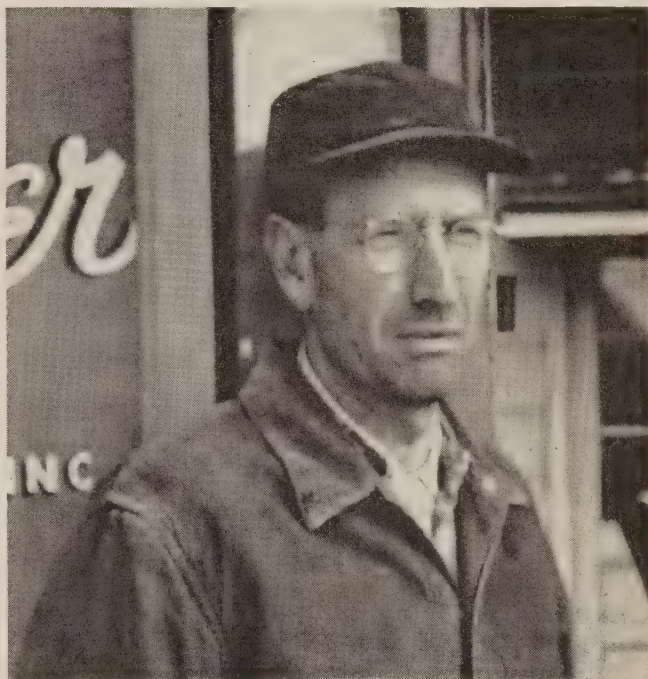
Greenbacker does not confine his conservation activities to district affairs. He attends all meetings of milk producers and retailers throughout the State. Because of his successful operation of a dairy farm, a retail milk delivery route, and a wayside milk and ice cream bar, his views receive respectful attention. At these meetings he always manages to get in a few licks for conservation farming.

He works closely and regularly with the State Commissioner of Agriculture. He makes a special point of getting to all public hearings within the State that relate to soil and water conservation.

At a Northeast area meeting of the National Association of Soil Conservation Districts,

Greenbacker held the center of attention as a member of a panel named to discuss the problem of vanishing farmland. That subject—the conversion of farmland to other uses—has long been a source of concern to him. When it was discussed at the Minneapolis convention, he was fully aware of its import. He has been right in the middle of it himself. He has seen orchards and dairy farms ripped out in nearby Wallingford to make room for new homes for the industrial city's own expanding population and the overflow from New Haven and Hartford. On the north side of his own place, he has seen a hospital take over a large piece of an orchard. He watched with dismay as a cluster of colorful houses edged out a sheep farm on the south side. He saw a "For Sale" sign go up one day on the 160-acre farm across the road. The Greenbackers themselves have been under pressure to sell their farm for a housing development.

"We've been asked to set our own price," Greenbacker said, sadly. He continued: "Connecticut needs its farms for its increasing population. We don't have enough farms today to supply all our own food needs. That's why 30 to 35 percent of our milk comes from other States. No State can afford to be wholly dependent on outside sources for its food supply. We



Charles Greenbacker.

still need sources close to market. 'Farm fresh' still has meaning for many people."

With farmland dwindling, soil conservation has become even more important than ever before, he believes.

So far Greenbacker has been able to resist the temptation to sell his farm to real estate developers at a fancy price. He likes conservation farming. He likes it so well that he has done a good enough job on his own farm to win a national Goodyear conservation award. Conservationist that he is, he wants to keep on farming—the conservaion way.

—TED PAWLOWSKI

Early History Of Drain Tile

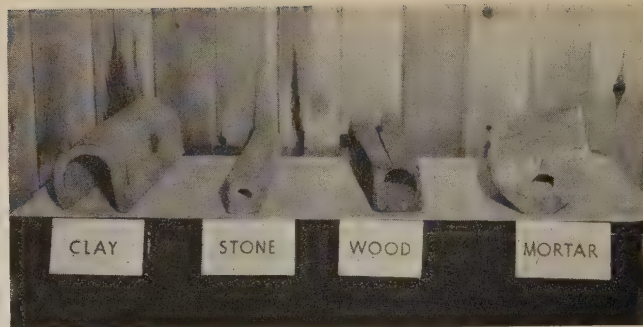
By M. M. WEAVER

EARLY American farmers have practiced underdrainage, of sorts, since colonial times. Stone, poles, brush, planks, and other materials were used for drains by these early American farmers. The first known record of tile being used in the United States was in 1835. This was when John Johnston, from near Geneva, N. Y., brought two pieces of clay tile from Scotland to use as patterns for handmade clay tile to be used on his farm. Stone, wood, and mortar were also used as materials for making tile, however, even after the clay tile were brought here by Johnston.

All clay tile was handmade in the United States until 1848. The clay was rolled out on a board somewhat as a housewife rolls cookie dough. Rectangles of the proper size were cut from the rolled clay and shaped over a pole, then air dried before baking. In some instances the lower leg of the person shaping the tile was used as a form: these were known as shinbone-shaped tile. Nearly all the handmade tile

Note:—The author is engineerig specialist, Soil Conservation Service, Waterloo, N. Y.

All photographs used with this article were made from the M. M. Weaver collection of drain tile at Waterloo, N. Y. The collection also includes about 200 other interesting types of old tile, not shown here.



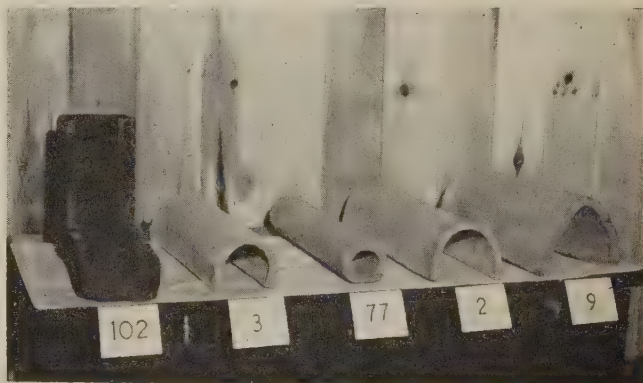
Materials used for making early drain tile in the United States. All tile shown here were made before 1850.

were horseshoe shaped until after 1850, though a few round tile were made by shaping around a short pole then removing the pole.

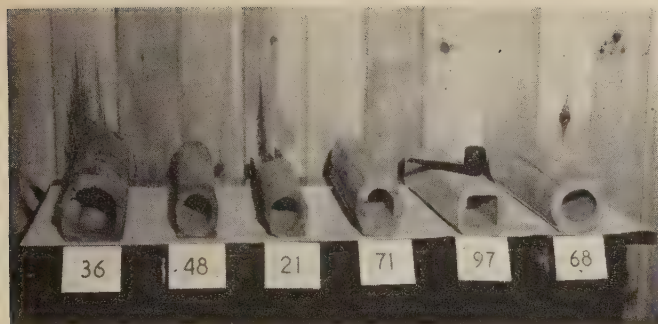
B. F. Whartenby of Scoli Yase, N. Y. established the first tile factory in the United States. He manufactured horseshoe-shaped tile with "club feet", that is, the exposed edges were broadened to help keep the tile from sinking into the floor of the trench in which it was laid.

In some cases, two sections of these early horseshoe tile were fitted together to form an oval tile. In other cases, three tile would be laid together to form a pyramid, that is, two tile would be laid parallel a few inches apart and a larger third tile laid on top of them. This arrangement gave much greater drainage capacity than could a single row of tile.

After the tile making machine was imported



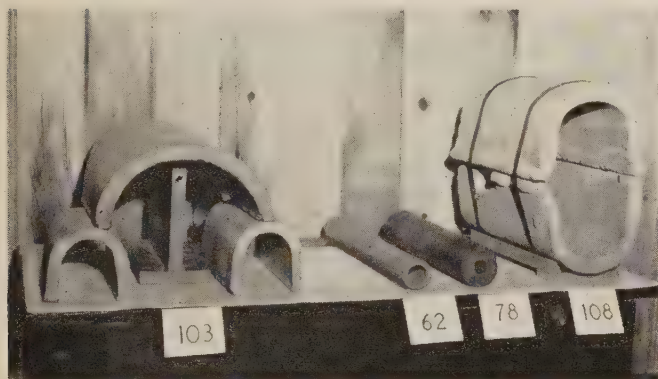
Some specimens of early drain tile. No. 102 is made of brick mortar in a brick mold. No. 3 is an open horseshoe with "club feet", and is one of a lot of 8,000 sold by B. F. Whartenby in 1853, for \$78.38. No. 77 is a round tile, shaped around a pole, about 1850. No. 2 is one of the 2 tiles brought from Scotland by John Johnston in 1835. No. 9 is a shinbone tile made about 1850.



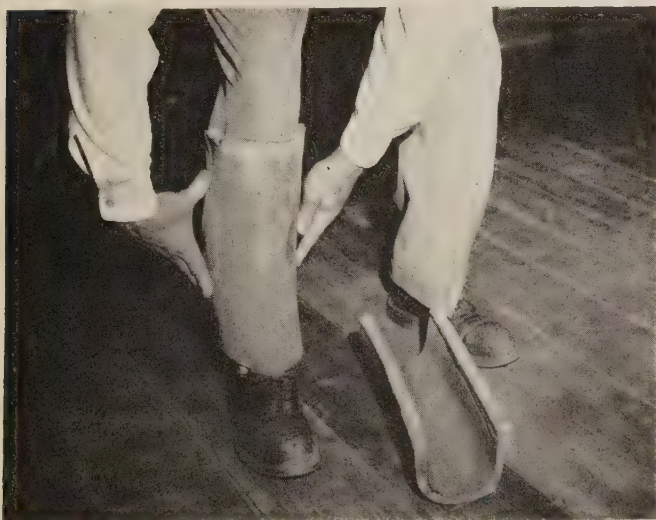
Shapes of some early drain tile: No. 36, flat-bottom horseshoe; No. 48, egg-shaped; No. 21, V-bottom horseshoe; No. 71, oval with 2 flat sides; No. 97, square; No. 68, round with 2 flat sides.



Some types of early tile joints: No. 222 is a Y-joint to connect a 2-inch tile to a 5-inch main, laid in 1856; No. 44 is a 2-inch tile with a 1-inch opening for connecting tile; No. 109 is a sawed joint laid in the 1860's and still operating in 1957; No. 110 is a 1-inch stone tile with lead joints, laid about 1850.



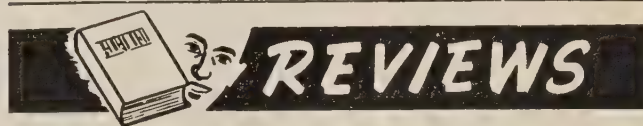
Some odd tile used in New York around 1850. No. 103 was laid as shown (except for the board supporting the center arch) on the John Johnston farm: an 11 inch arch was laid on top of two 4-inch open horseshoe tile; No. 62 is a 1-inch tile from the Borst farm near Utica, N. Y.; No. 78 is a $\frac{3}{4}$ -inch tile, which is the smallest in the Weaver collection; No. 108 was laid as shown for tile main.



This man demonstrates the method of shaping a "shin-bone" tile. The tile on the floor was shaped around a pole.

in 1848, some factories began making round tile. The change over from horseshoe shaped to round tile took place gradually from 1850 to 1865. A few horseshoe tile were manufactured after 1865, but not in quantity, because the round tile were proving to be much more efficient. Hexagonal tile also became popular in some communities around 1865. After that, most tile factories standardized on either the round or hexagonal shapes although there were some variations. In some cases, one or two flat edges were formed on round tile, while various other shapes, including square tile were occasionally made.

As with the tile shape, there were also many variations in types of joints. Metal bands, burlap, tar paper, and other materials were used to keep sand and soil from filtering into the tile at the joints. Clay collars were used by some. A socket pipe, similar to a bell and spigot pipe, was also used in some cases. Joint types were also standardized gradually, and the types we use today evolved.



FUNDAMENTALS OF SOIL SCIENCE. By C. E. Millar, L. M. Turk, and H. D. Foth. 3rd Edition. 526 pp. Illustrated. 1958. New York: John Wiley & Sons, Inc. \$7.75.

THIS edition comes after 7 years' experience with the 2nd edition, now well-known as a satisfactory introductory textbook. Since the 2nd edition was remarkably up to date, relatively few changes have been needed. The chapters on Soil Development, Physical Properties, Classification of Soils, and Soil Moisture have been most changed. Enough new material has been added to keep the book well up to date.

The major emphasis in this text, as in the earlier editions, is on the soils and soil-management problems of temperate humid regions. The entire treatment of arid lands is shorter than the discussion on liming. And, the authors unconsciously assume that all clays are much like those of Michigan when they discuss soil management, even though they emphasize some of the differences between clays in the same chapters. Still, for the purposes intended, this is an excellent book.

—GUY D. SMITH

THE AFFLUENT SOCIETY. By John Kenneth Galbraith. 368 pp. 1958. Boston: Houghton-Mifflin Co. \$5.

IN this book Dr. Galbraith has given us an up-to-date analysis of our high-producing and high-spending society. He points out the weaknesses in applying economic principles developed in an age of scarcity, when most people were poor, to our present society in which only a minority is poor. He asserts that, "The shortcomings of economics are not original error but uncorrected obsolescence."

The author is a well-known scholar of economic science, including agricultural economics;

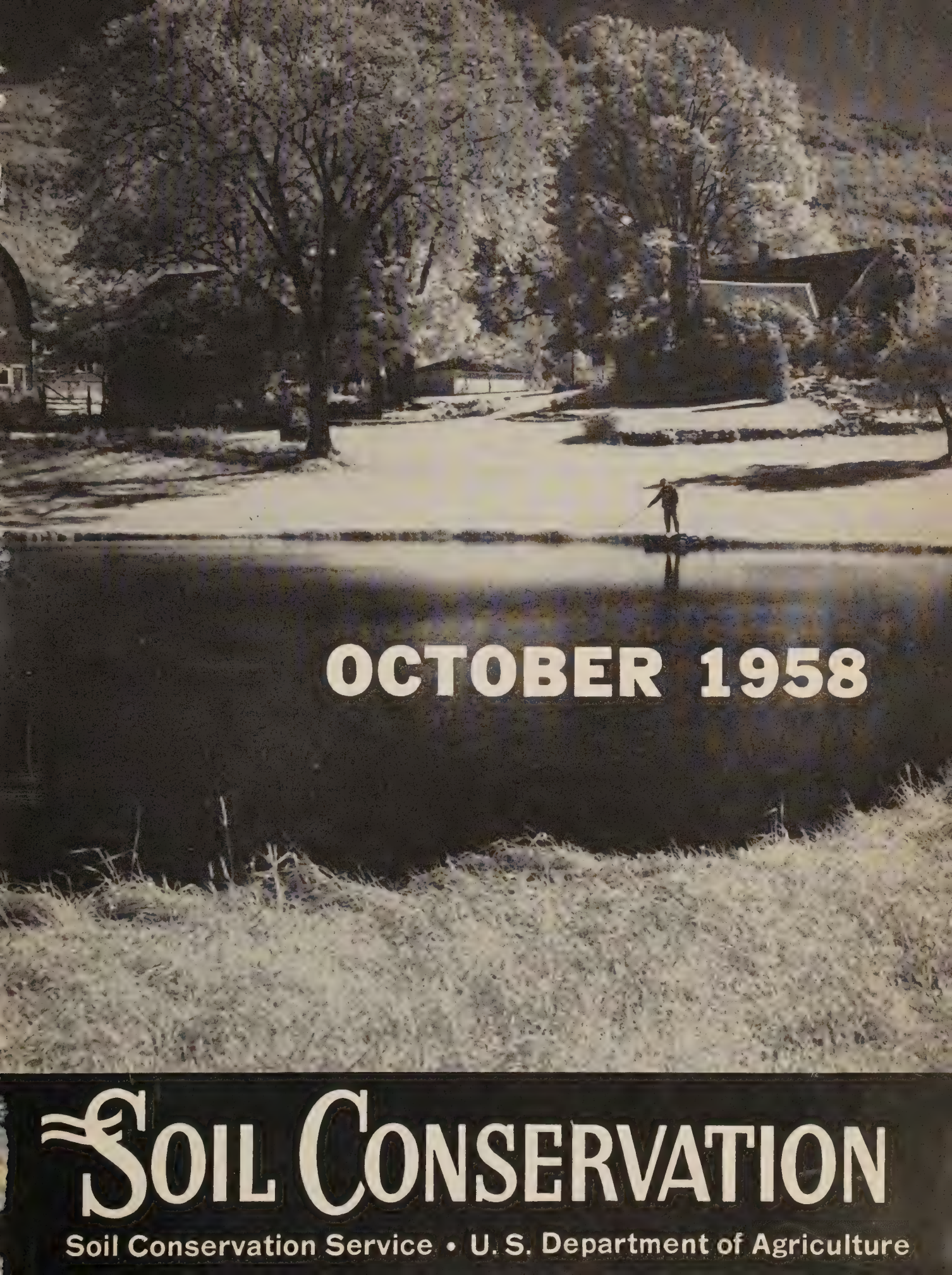
yet, he writes simply, with unusual clarity, and with rare good humor.

The explanations of our present economic problems by such a well-qualified authority are important to every citizen. Dr. Galbraith has brought an enormous amount of study to bear on his task. Especially, has he worked hard on the writing; therefore, it is lucid and easy to read. Perhaps many readers may not agree with some details. Yet, most will be stimulated to think for themselves. It is that kind of book.

Following the analysis, the author goes ahead and makes proposals for change. Like all new ideas and proposals, these will be controversial, perhaps highly so. One doubts that Dr. Galbraith expects them to be embraced either immediately or in the form he suggests. But in a democracy even the cautious reader must applaud intelligent attempts to explain our major economic and social problems in lucid terms for laymen by a scholar of unquestioned integrity.

—CHARLES E. KELLOGG

HYBRID GRASSES FOR THE SOUTHEAST.—The ARS and Georgia Exp. Sta. recently announced the release of two hybrid forage grasses adapted to many parts of the southeastern U. S. One is an annual pearl millet hybrid called Gahi-1. In tests at Tifton, Ga., Gahi-1 produced 50 percent more forage than common pearl millet. The other is a hybrid Pensacola Bahia-grass, called Tifhi-1. This hybrid outyielded regular Pensacola Bahia during 4 years of testing. Steers gained an average of about 70 pounds more per acre per year on Tifhi-1 than on Pensacola Bahia.



OCTOBER 1958

Soil Conservation

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION.

EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

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TOM DALE, Editor

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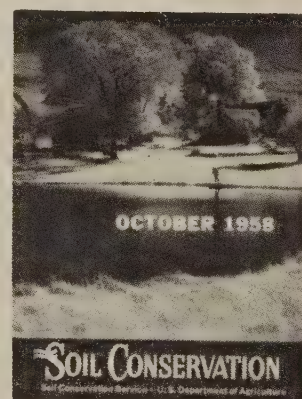


THE HUGH BENNETT CUP.—In São Paulo, large and prosperous Brazilian state, Soil Conservation Day has been established by state decree to coincide with the birthday of Hugh Hammond Bennett, former Chief of SCS, whom the Brazilians call the "Father of Soil Conservation." On April 15th, every year, special programs and appropriate festivities mark the day, with educational lectures, displays, banquets, and announcements of work accomplished on the land and the next year's goals.

Presentation of the *taça Hugh Bennett*—the Hugh Bennett Cup—was an important feature of São Paulo's Soil Conservation Day in 1958. *Folha da Manhã*, one of Brazil's outstanding newspapers, received the award for its carefully conducted conservation-education campaign through 1957.

Bennett was Chief of the Soil Conservation Service from the time of its establishment in the U. S. Department of Agriculture in 1935 to his retirement in 1952. He now devotes his time to writing, lecturing, research, study, and consultation with foreign governments on soil and water-conservation problems.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—A farm pond in Vermont that supplies stockwater, fire protection, and recreation.

Photo by Gordon S. Smith.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Controlling A Spring Fed Gully

By ERNEST A. CHRISTIE

ONE of the most difficult conservation jobs is to establish a grass waterway where constantly running water is cutting a gully. Elmer Barr, a cooperator with the Brown County Soil Conservation District, is solving this problem by using reed canarygrass. An outstanding feature of reed canarygrass is that it can develop roots from the nodes of stems and grow while submerged in water. Barr takes advantage of this feature to control an active gully and establish a grassed waterway on his farm north of Hiawatha, Kans.

Mr. Barr's 80 acre farm is located in the Walnut Creek Watershed. A gully 1,000 feet long, 12 feet deep, and 30 feet wide was clogged with brush and trees. The gully drained about 220 acres, while a spring fed water into it the year around. Mr. Barr, working with local Soil Conservation Service technicians, decided to build an erosion control dam at the lower end of the gully and shape the upper portion into a waterway.

The erosion control dam was built, the brush removed, and the waterway shaped and seeded

Note:—The author is a soil conservationist, Soil Conservation Service, Hiawatha, Kans.

to reed canarygrass in early spring. The running water prevented a stand of grass in the center of the channel and left it unprotected.

On June 28, 1957, Mr. Barr and local SCS technicians cut a supply of fresh green reed canarygrass hay on the farm of a neighbor, Maurice Cashman. The grass was cut with a small sickle bar mower and hauled to the waterway immediately after being cut. Once at the site the green hay was spread by hand and tramped into the mud.

The hay from about 1,500 square feet was used to cover an area of about 1 acre. The hay contained some mature seed. Tramping with bare feet was found to be superior to tramping with overshoes, much to the delight of Mr. Barr's two boys, Wayne 11 and Tommy 8, who helped with the tramping. It was somewhat difficult to get the hay anchored in the soft mud. As fast as one end of a stem was buried, the other end would pull out, but the job was finally completed.

A check of the area, 3 weeks after planting, showed new shoots developing from the joints of the old stems where the soil had re-



Spreading green reed canarygrass hay and trampling it into the mud of a spring fed waterway. Erosion control dam with outlet is in left background.



Root and shoot development at joints of Reed canarygrass, 3 weeks after the hay was spread.

mained moist or where the stem was submerged in water. Some of the seeds had sprouted and were growing well. By October 10, these shoots had developed into husky young plants that were beginning to catch silt. The silt was causing the running water to spread and keep a larger area moist. The young reed canarygrass plants were beginning to spread into the moist area by rhizomes or underground stems. Within a year or two the gully will be healed, the pond below will have additional protection against silting, and there will be good cover for wildlife.

This method of establishing grass will not work in every case. The soil must stay wet



Inspecting well-developed Reed canarygrass plants in waterway, 3 months after hay was spread and trampled into soil

while the grass is becoming established, and a good source of vigorous healthy reed canarygrass for a supply of stems is essential. The stems must be spread soon after cutting. A considerable amount of hand labor is involved and the method may not be practical for large areas.

Upside-Down Land

Land Leveling Operations Required the Moving of Practically All the Soil on a Farm and Turning the Soil Upside Down in the Moving Process.

By G. B. SWIER

LAND leveling is an important and popular conservation practice in the Wapato Soil Conservation District of central Washington. But few farm owners have done such a thorough job of face-lifting in their leveling operations as have Wilfred Hall and Herbert Harmon. They have literally transformed an 80-acre farm from a rocky, hard-to-irrigate piece of ground to a productive farm, with controlled irrigation grades, and in addition have created a wildlife area.

During the summer of 1957, Hall and his partner Harmon bought this farm unit for \$20,000. They requested assistance from the Wapato Soil Conservation District to "level" the land—including excavating and burying gravel bars—so as to have a minimum of 18 inches of topsoil over the farm when the job was completed.

SCS technicians did the survey work and established grade stakes. The soil is Naches sandy loam, old alluvium river terrace, with gravel occurring at every depth from the sur-

Note:—The author is work unit conservationist, Soil Conservation Service, Toppenish, Wash.

face to 5 feet. The shallow soil is usually on the higher ridges, and the deep soils are found in the swales and sloughs. To assure 18 inches of topsoil it was necessary to remove soil from the swales and replace it with gravel, then re-cover the gravel-filled areas with topsoil.

On ridges where gravel was within 18 inches of grade, it was necessary to first remove and stockpile the good soil and remove the gravel to 18 inches below grade, then replace it with 18 inches of swale topsoil. This "trading" of soil for gravel changed the original soil to such an extent that 31 acres of poor land were reclassified and improved by several capability classes.

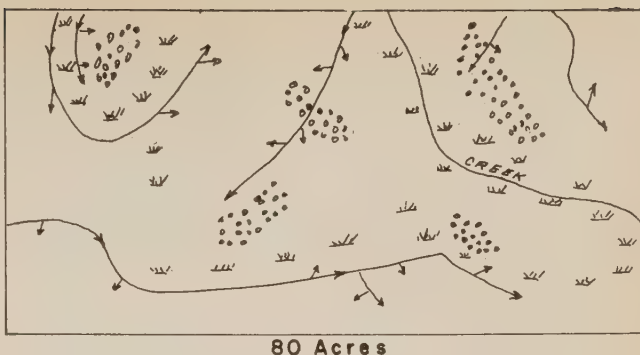
The contractor, George Bolton, soon worked out a system to exchange the good soil in the sloughs with gravel on the ridges. He established "haul-roads" to carry gravel to the slough and tillable soil to the ridges so that the finished job showed no surface gravel.

Two 50 horsepower crawler tractors, with 5-cubic yard carryall scrapers, and one 50 horsepower tractor, with an 8-cubic yard elevating-type scraper, were used. An estimated 125,000 cubic yards of material was moved, about 40 percent of which was gravel. About one-half of a mile of permanent road and one-half acre of farmyard were graveled in the process.

The irrigation system was designed for the use of siphon tubes and temporary open-head ditches with plastic dams. The design called for a finished irrigating grade of .25 percent and a side slope of .03 percent, with 660 foot runs on 3 fields, and 800 foot runs on the fourth field.

The "bonus" payment came from changing an unsightly 14 acres of permanent slough into 10 productive farm acres and an attractive 4-acre wildlife area. This area still provides drainage for the lands lying above, but it is now a natural habitat for pheasants, waterfowl, and fish. The old slough channel was straightened and narrowed by 'dozing gravel over the cattails and saving the topsoil for the reclaimed land. An artificial island was built at a wide place in the creek.

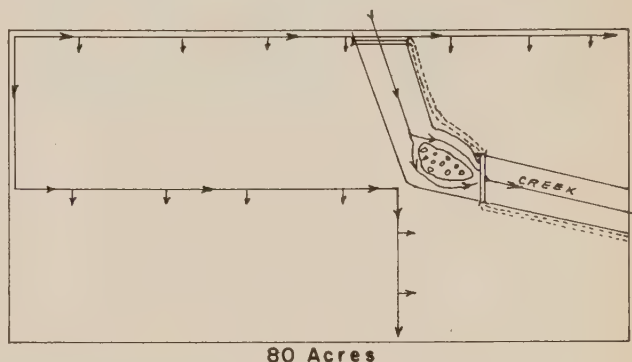
A permanent gravel road borders the wildlife area which gives easy access to all farm fields. The road crosses the creek at two places, where culverts are installed to regulate the depth of the water. Hundreds of sumac, elderberry, and



BEFORE DEVELOPMENT

45 Ac. Cropland Class I and II
17 Ac. Gravel Class IV
18 Ac. Sloughs Class VII

LEGEND
●●● Gravel
~ Sloughs



AFTER DEVELOPMENT

76 Ac. Cropland Class I and II
4 Ac. Wildlife Area

cottonwood were removed to improve the site. Two small groves were thinned out and can be used for natural duck blinds.

The total cost for the improvement was \$12,000, in round figures. This, plus the original cost makes \$32,000 that Hall-Harmon have invested. They do not plan to sell this farm, but believe it should sell for \$60,000. In any event, the return on their improvements should pay out 3 to 1, gross crop tonnage should increase by 500 percent or more, while local tax valuation increased 400 percent. Hall and Harmon figure that the \$12 per acre ACP payment will offset the increase in local taxes for several years.

In the meantime Wilfred Hall and Herbert Harmon have a beautiful productive farm, and the contractor and SCS technicians have one more good reference for farmers and others to view.

Pangola Versus Hurricane

In Battle of the Grasses on the Virgin Islands.

By ALFRED H. OVESEN

HURRICANEGRASS, an unwelcome guest which has infested 16,000 acres of good pasture and cropland on the Island of St. Croix, V. I., appears to have met its match. It looks as if pangolagrass might effectively eradicate hurricanegrass, where other competing species have failed.

The Virgin Islands, and St. Croix especially, have always needed a grass capable of withstanding drought, that would compete with hurricanegrass (*Andropogon pertusa*), and at the same time furnish feed for livestock.

The common grasses, Guineagrass, bermudagrass, paragrass, St. Augustinegrass and Mexican bluestem, turn dry during the drought, and

animals are forced to eat weeds, trees, and even cactus.

Barbados sourgrass showed promise, but planting by seed was a risk in that seeds sometimes were not viable. Planting Barbados by clumps was too expensive, and growth was too slow in covering the ground.

In searching for a better competitor for hurricanegrass we found that a grass had been imported from Africa during the late 1930's and at that time was being tested by several agricultural stations in Florida. We thought we should try it on St. Croix.

Working with the Extension agent, the Soil Conservation Service secured enough propagation material of pangolagrass (*Digitaria decumbens*) to make several trial plantings. A

Note:—The author is conservation aid, Soil Conservation Service, St. Croix, V. I.



The block of pangolagrass in the foreground was planted in a field of hurricanegrass. It has almost completely eliminated the hurricanegrass, though hurricane still thrives in the background.

total of 24 small bundles weighing about 5 pounds was received in 1950 and planted in a prepared seedbed at Estate Anna's Hope.

Eight months after planting, the bed was completely covered with grass runners 5 to 8 feet in length. Its peculiar characteristic of pegging at the joints was noted and its tendency of fast coverage of the surrounding area showed promise.

It was decided that we should get some farmers to make field tests of this grass. Small amounts were distributed in various sections and on different types of soil.

Its growing habits and coverage were considered excellent. Interest in this grass became so widespread that farmers were taken to the several areas to observe growing conditions and the pasturage furnished to livestock.

Many of our farmers feel that pangolagrass, in the eradication of hurricanegrass, may not be the complete solution to the problem, but that it is the best grass now available to solve this weedy problem.

Tests have indicated that pangolagrass not only competes with the hurricanegrass, but eventually smothers it out. The tests also indicate that pangola will furnish more pasturage than any of the other grasses tested, and yields about 5 times as much pasturage as hurricane.

To give the pangolagrass as severe a trial as possible it was necessary to plant it on an area entirely surrounded by hurricanegrass. No land preparation, such as plowing or harrowing, was done. Instead, an area was selected in a solid hurricane pasture. A replicated complete block design was laid out. Each block was subsoiled, and pangolagrass, Barbados sourgrass, Guineagrass, and coastal bermudagrass were planted in the furrows left by the blade of the subsoiler. Solid areas or rows of hurricanegrass were left between furrows to observe the competition of the various grasses with hurricane.

Guineagrass did not increase. Instead, all blocks planted to Guineagrass became a solid area of hurricanegrass, with a few sickly clumps of Guinea remaining.

Barbados sourgrass has not shown any increase and remains the same as when planted. Coastal bermudagrass, after a while, showed the effects of the encroachment of the hurricanegrass.



Pangolagrass (*Digitaria decumbens*).

In all areas planted to pangolagrass, the pangola has completely covered the blocks and sent runners into adjoining blocks. In fact, the only green area seen in this hurricanegrass pasture, is the blocks of pangolagrass. There are a few blades of hurricanegrass showing in the pangola blocks, but we believe these will soon be smothered out.

Tests of field conditions in several pastures throughout the island, under severe conditions, have proved that this grass is actually compet-



A field formerly covered with Guineagrass has been completely covered with hurricanegrass. Light colored patches on hills in the background show that hurricanegrass is also taking over there.

ing with four important factors: (1) drought, (2) hurricanegrass, (3) overgrazing, and (4) aphids.

An aphid, *Sipha flava*, has been found to attack this grass under some conditions. It has attacked the older established sods more frequently than the younger sods. The observed damage has been negligible based on observations made at different seasons of the year on widely different soil and climatic conditions. A system of rotational grazing, allowing the grass to remain at heights of 8 inches or less, makes it difficult for the aphids to survive, due to winds, heat of the sun, insects, rain, and the trampling of the hoofs of the livestock.

From experiments, pangola was found to be more aggressive than coastal bermuda, and to control weeds better; although, coastal bermuda regrows faster after grazing than pangola does under similar conditions. On some fertilizer tests, pangola was found to be more responsive to fertilizer treatment than coastal bermuda and has produced higher yields when grown under similar conditions.

As an example of grazing capacity, one farmer planted 6 acres of pangolagrass. Good seed-

bed preparation was provided, consisting of 2 plowings, 2 harrowings, and subsoiling. Pangola was planted, using the clump or stool method in rows 2½ feet apart.

This field was in an area surrounded with hurricanegrass. The field planted in October 1955 made a complete cover by May 1956. Due to the farmer's not having enough pasturage his livestock, consisting of 19 head of cattle and 2 horses, were turned into this field. This 6-acre plot was his only source of feed up to December 1956. During January and February 1957, it was rested and allowed to rejuvenate. This farmer and others are proud of the performance pangola has given and the way it has reacted.

With the results shown by pangolagrass in its ability to not only survive and halt the encroachment of hurricanegrass, but eventually to smother out this undesirable species of grass, interest in pasture improvement has been accelerated. At the present time the agricultural station and farmers who have already established pangolagrass fields are assisting other interested farmers with planting material to establish their own propagation areas.

Pipelines May Be Hazardous

Pipeline Representatives, Earth Moving Contractors, and SCS Technicians Discuss Safety Measures for Land Improvement Operations Near Pipelines.

By JAMES W. McDOWELL

“WE can clean up the mess, but we cannot restore a human life,” stated Donald Bakewell, representative of the Platte Pipeline Co. He was speaking to a group of earth moving contractors and Soil Conservation Service technicians at a joint meeting of the two groups.

Bakewell continued, “Our line carries crude oil from Wyoming and western Nebraska oil fields to Illinois. A pressure of about 1,000 pounds per square inch is maintained, so you

can imagine the danger a person would be in if he should sever the line. In addition to the tremendous pressure there is the fire hazard. Our line is supposed to be a minimum of 36 inches underground at all points. However, you men don't need to be told that erosion may have reduced that in some places. Our line is marked at every section line, and on the marker is our address and phone number. Whenever you intend to build a pond, terrace, or level land near our line, we want you to call us collect so that we can take the necessary steps to insure your safety and our line.”

Note:—The author is work unit conservationist, Soil Conservation Service, Geneva, Nebr.

At the same meeting, Ralph Shirley, of the Kansas-Nebraska Natural Gas Co., expressed his appreciation for the cooperation of the SCS and contractor groups that resulted in the reduction of mishaps on the Kansas-Nebraska lines during the past year. He gave every one present a detailed map of the location of all gas pipelines in the area. His company fears mainly for the safety of individuals, although a line break is of no minor consequence to a gas company, either.

What these two men said, and the spirit of cooperativeness in the way they said it, was the theme of the entire SCS-contractor meetings. This was the second annual all-day meeting of this type held in south-central Nebraska. To accommodate the largest possible number of people, two sessions of the same meeting were held, one at Geneva, the other at Beatrice, Nebr.

J. Dexter Haws, area conservationist, Hebron, Nebr., states: "We started holding these meetings to bring a closer working relationship between our SCS people and the local land improvement contractors. These contractors often worked across county lines and found individual differences in the manner that SCS employees were doing business. These meetings have helped to develop uniform interpretations by our employees and have developed common understanding among the contractors and technicians. Our relations have certainly been strengthened."



Victor Schroeder of the Kansas-Nebraska Gas Company and Henry Gembala of SCS look at a marker that identifies the location of a gas pipeline.



Contractors and SCS technician show depth of cut and drainage ditch made in land leveling operations near Bruning, Nebr.

Occupying a large part of the program, as well as making the arrangements for the event, are Area Engineer Henry Gembala, Hebron, Nebr., and Assistant Area Engineer John Overing, York, Nebr. They go over the specifications for the various soil- and water-conservation practices used in the area so that no doubt can be left in anyone's mind as to what is expected. The Agricultural Stabilization and Conservation Committee gives a report on current ACP regulations.

Since land grading cuts sometimes exceed 4 feet in depth in this area, pipeline company representatives have been invited to these meetings to protect their interests.

The contractors are given a portion of the program to express their views. This year, two rival machinery sales companies teamed together and presented unbiased cost data of earth moving machinery operations.

Mr. Robert Keister, Geneva, Nebr., of the Keister-Walker Construction Co., had charge of the contractors' part of the 1958 meeting at Geneva. He had this to say: "This thing is getting bigger and better every year. I counted 21 different contractor organizations here today and I understand that about 40 firms were represented at Beatrice."

With the 1958 meetings over, contractors, SCS technicians, ASC, and pipeline company representatives are already gathering ideas to make the 1959 meetings even more successful.

HIGHWAY EROSION CONTROL IN NORTHWEST GEORGIA

No. 38

This is the thirty-eighth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By E. C. RICHARDSON, E. G. DISEKER,
and B. H. HENDRICKSON

WHEREVER modern highways are built through hilly country numerous cuts and fills are required. Both cuts and fills expose steep slopes of soil or subsoil where rapid runoff and high rates of erosion usually occur. Unless protected by vegetation they are a serious hazard to highway maintenance, and they contribute large quantities of runoff water and sediment to further aggravate downstream flood-control problems.

In the fall of 1956, a cooperative research project was set up to study highway erosion-control problems and work out solutions for the Coosa Watershed of northwest Georgia. The State Highway Board, State Experiment Station, Soil Conservation Service, and Agricultural Research Service cooperated in the study.

With field headquarters at Cartersville, Ga., a number of roadside areas were selected in Bartow, Cobb, and Paulding Counties along the 4-lane U. S. Highway No. 41, which had numerous unprotected cut banks. The unprotected banks ranged from approximately 5 feet to 25 feet in height. The side slopes of the cuts varied from 1:1 to 3:1 with a length of 100 to 1,320 feet.

Three principal types of studies were made or are underway. A greenhouse-fertility survey was made to determine the essential plant food requirements lacking in the soils. Most of the soils exposed in these cuts are typical B and C

horizons of the Cecil, Lloyd, Helena, Madison, and Louisa soils and the C horizon of Louisburg and Talladega. The fertility study revealed a general condition of high acidity, averaging 5 pH, an almost total lack of nitrogen and phosphorous, and an inadequate amount of potash. Southland oats were used as the test crop in the greenhouse-pot experiment. Response to Esminel, a mixture of minor elements was inconclusive. The need for fertilizer and lime was clearly indicated in all cases, except for the sandy Louisburg, which did not respond to lime.

The engineering work consists mainly of the design, fabrication, installation, and operation of Coshocton wheels to measure and sample runoff and soil from highway shoulders, unprotected ditches, and cut slopes.

Threesets of N-2 type, 24-inch diameter wheels were installed at the lower end of the road ditches on Cecil clay soil to collect runoff and soil from unvegetated road cuts and banks. The total runoff area varied from .2 to .4 acres per plot, with bank side slopes of 1:1, 2:1, and 3:1. Heights of cuts varied from 5 feet at the lower end to 25 feet near the upper end, with lengths from 300 to 350 feet. Runoff from the paved highway and the area above the plots was diverted by vegetated dykes or diversion dams.



Sediment collects in the lower end of a bare highway ditch as a result of erosion in the upper end.

Note:—The authors are, respectively, agronomist, agricultural engineer, and soil conservationist, Agricultural Research Service, Cartersville, Ga.

All runoff and soil losses, which flowed through the H-flume of the Coshocton wheel, were fractionated and piped to a 400-gallon storage tank. There a water-stage recorder also measured the runoff from each installation. Representative samples were collected from the tank and the flume and used for calculating soil and water losses in tons per acre. Rainfall measurements were made with recording gauge at each location.

Due to variations in highway ditch grades, scouring may occur in some instances and deposition in others. Therefore, on two plots, five rows of metal pins were installed as reference points to determine the extent of erosion or sedimentation. Measurements were made at 1-foot intervals between the squares of pins and across the diagonals at the time of installation. Annual measurements will be made from the two rows of pins in the flow channel and from the row approximately 3 feet above the channel. Deposition found from these measurements, plus the soil collected from the Coshocton wheels, will give the total soil losses from the unprotected roadside cuts.

After a 5-year study of the soil and water losses on the unprotected cuts and ditches, these areas will be planted with the most promising vegetative cover and the study continued.

During the first year 21 plant species were used in the vegetative cover studies. These were planted on different soil types with different exposures; on banks ranging in height from 4 feet to 25 feet, with slopes varying from 4:1, up to as steep as 1½ to 1. Both annual and perennial grasses were used. Some were cool-season while others were warm-season plants. Also included were viney-type plants for steep and rugged areas. All species were fertilized uniformly with 1-ton of 4-12-12, 2-tons of marble dust, and 5-tons of chicken manure per acre. All species were planted with and without mulch.

On a few areas mulches and fertilizers were applied without seeding. These treatments were made to determine the possibility of developing cover from native plants existing on the roadside areas.

Fescue, Oklahoma bromegrass, and orchardgrass of the cooler season perennial grasses proved to be best and ranked in importance as listed. All of these grasses remained green



Bermudagrass in the foreground with Bahiagrass in the background stabilize a highway bank.

throughout the summer, except during the worst part of the drought. Fescue in most instances had a good stand and produced excellent cover by the end of the first growing season. Bromegrass was perhaps a little more resistant to drought than the other two and thickened up better than either orchardgrass or fescue, as a result of volunteer seedlings. Orchardgrass appeared to be less resistant to drought and more susceptible to disease.

Of the perennial summer-growing species, common bermudagrass and weeping lovegrass gave the best results. Bermuda, in most cases, had a good stand and the few plantings with a



The well-covered bank in the left foreground was planted to fescue after mulching. The partially bare bank in the background was planted to fescue at the same time, but without mulching.

partial stand soon spread and developed into thick sods. Weeping lovegrass is a bunch grass; therefore, it did not thicken up like bermuda. In the older plantings of lovegrass the base of the bunches eroded, which caused the plants to stool and die. Lovegrass was the easiest plant of all to develop a stand and quick cover.

The Bahiagrasses were slow in developing covers for the banks, and their seed drifted or floated downslope worse than any of the other species tested. Rye, a winter annual, and browntop millet, a summer annual, proved to be valuable for developing cover quickly in season, and they left a mulch on which to seed perennials. Browntop millet attracted wildlife when planted adjacent to desirable cover. English ivy and daylilies were used as ornamentals to a limited extent in public areas adjacent to homesites, schools, and churches.

Many sites studied on road banks were several years old. Numerous plants like broom-sedge, common lespedeza, trailing perennial lespedezas, and beggarweed were found. Several such areas were fertilized and mulched without seeding, and a protective cover resulted by the end of the first growing season. This suggests

that many miles of highway banks may be stabilized and covered quickly and cheaply by fertilizing the native species already in such areas.

Mulch applied in correct amounts helped secure uniform stands. The soil under mulch remained moist longer than unmulched soil. This aided germination of the planted grasses. Benefits derived from mulch varied with slope of bank, species, and planting date. On 1:1 steep slopes mulch was essential to anchor seed and prevent them from drifting downslope. Round seed, like vetch and clover, drifted worse than long seed like ryegrass. Mulch reduced damage from frost to late seedings and improved the growth of plants, particularly on steep areas. Plants had better color and vigor on mulched plots as compared with those without mulch. Mulch also aided in the retention of fertilizer uniformly over a plot. But all species tried were successfully established on slopes 2:1 or less without the use of mulch when seeded on the proper date.

Preparation of the soil was not too difficult on slopes 2:1 or less. On slopes steeper than 2:1 preparation of the soil was difficult due to the drifting of loosened soil downhill.

Utility Company Promotes Conservation

By LOUIS B. EARLE

ATTRACTIVE red and white signs may be seen at the entrance to 283 farms in Sedgwick County, Kans. The signs announce: "KG&E AWARD For Completed SOIL And WATER CONSERVATION."

The signs are furnished by the Kansas Gas and Electric Company, and are proudly displayed by the farmers who have earned the right to display them.

Several years ago the board of supervisors of the Sedgwick County Soil Conservation Dis-

trict was searching for ways to encourage a more rapid spread of conservation practices. The supervisors decided that attractive signs would help by pointing out those progressive farmers who had good conservation programs. The Kansas Gas and Electric Company agreed to cooperate with the district in this advertising campaign.

Now this gas and electric company stages an award banquet each year, to which all award-ees are sent a written invitation. The list of awardees is supplied the company by the district supervisors. Both landowners and tenants

Note:—The author is work unit conservationist, Soil Conservation Service, Wichita, Kans.



Rodger Lemon, chairman of the board of supervisors of the Sedgwick County Soil Conservation District, speaks to the guests at the 1958 KG&E Awards Banquet.

are invited to the banquet, along with their wives. This banquet is quite an affair, since many prominent businessmen as well as conservationists are invited. All award winners are listed on the banquet program. The award itself consists only of a post and the attractive sign. Yet, it is much sought after by cooperators of the Sedgwick County district.

To qualify for an award a farmer must be a cooperator with the Sedgwick County Soil Conservation District; he must own or operate a farm of 80 acres or more; and, he must have applied all of the essential soil- and water-conservation practices to the land and must be maintaining them. In other words, all the land must be used according to its capability and treated according to its needs for continued long-time production.

An owner or operator can win an award for each farm he owns or operates.

At the awards banquet on March 1, 1956, 175 farms received the award. At the 1957 banquet, 55 farms received the award, while 53 farms were so honored in 1958.

The district supervisors are well satisfied with the program. People in some other counties in Kansas wish they had such a program. Many farmers ask both SCS technicians and district supervisors, "How do I get one of those red and white signs?"

When they are told how, many farmers go

ahead and complete all their necessary soil- and water-conservation work.

KG&E has offered the same program in all counties they serve. One of these is Crawford County, Kans., which started the program in the spring of 1958 with 17 farms being honored.

"These 283 red and white signs on Sedgwick County farms are a constant reminder to the 2,800 other farm owners and operators in the



Otto Beuke (right) and SCS technician look at the award sign displayed at the entrance to Mr. Beuke's farm.

county that they are still losing too much water and too much soil and had better get busy," said Roger Lemon, chairman of the district board of supervisors.

"We look to the time when we can read on every farm in the county the words KG&E Award For Completed Soil And Water Conservation," he added.

Gordan Evans, president of KG&E says: "Why is KG&E interested in soil and water conservation? In our widespread electric company operations we can see the importance, not only to the individual farmer in following a program of soil and water conservation, but we can notice the effect it has on the urban economy where these practices bring about a healthy and prosperous rural economy.

"Industrial development, quite often is tied in to natural resources and farm products.

"The largest part of a farmer's "plant" is, of course, in his land, and this farm plant must be maintained if adequate production on the farm is to continue. If conservation practices are not followed, then the fertility of the land can and will be reduced by every hard rain or heavy windstorm.

"In the past, business leaders have not shown enough interest in soil and water conservation. They failed to realize how it affected them and our whole economy. Now more and more business leaders are beginning to realize that this problem needs the help of all to solve, and further, that it is not only a local problem but it is one of regional and national significance."



"CONSERVATION ADVENTURES With Dick and Debbie" proved fascinating to eighth-graders (left), David Atwood, Joan Woods, and Brenda Baker at the Center Rutland School, Vt. The 24-page, picture-booklet was designed especially for youngsters by the State Association of Soil Conservation Districts and made available to all public and parochial schools in the Green Mountain State. Teachers have used it to introduce conservation in grades 4 through 8. Center Rutland's principal, Miss Ann Riley, commented: "It's easy to read and the pictures are very interesting."

Grass Helps Papermakers

Grass Stabilizes Canal Banks, Greatly Reduces Canal Maintenance, and Insures Purer Water for a Paper Manufacturer.

By LEON J. SISK

PAPER is now just a little bit cheaper at Georgetown, S. C. as a result of a few days work done in 1955 by W. M. Steedly, work unit conservationist of SCS at Georgetown.

Steedly, working in cooperation with International Paper engineers, helped develop a plan for seeding the banks of the company's water supply canal that is saving the company \$50,000 a year.

Twenty-five million gallons of water per day are required to produce International's Georgetown mill's daily output of 1,800 tons of paper. The water is obtained from the Pee Dee River, 27 miles north of Georgetown. At the Pee Dee the water is lifted by two 100-horsepower pumps and dumped into a canal where it flows by gravity for 17 miles to the Black River.

There the water is piped under the river to another pumping station where 2 electric pumps lift it into a 45-acre reservoir at the rate of 34,000 gallons per minute. From the reservoir the water again flows by gravity through a canal to a third pumping station at the city limits of Georgetown. From there the water is piped to the paper mill on the Sampit River, a mile away.

Until 1954, water was obtained from the Black River. That year drought lowered the flow of the river, and hurricane tides drove so much salt water up the river the plant processes were seriously disrupted by the salt water.

It takes not only large quantities of water to produce sulphate paper, it takes pure water. Even a relatively small amount of salt or acids in the water renders it unfit for making pulp and paper, and this may result in extensive damage to the paper-making machinery, which represents a capital investment of millions of dollars.

Consequently, when the water from Black River repeatedly tested high in salinity, plant officials began looking for a new source of water. Investigations revealed the only reliable source for the Georgetown mill to be the Pee Dee, about 27 miles away.

Rights-of-way were obtained and work started on the canal. One and a half million cubic yards of earth were moved in its construction. The canal averages 10 feet in width at the bottom, with an average top width of 40 feet. The sides have a 2 to 1 slope. The water flow is approximately 7 feet deep.

While banks with this slope are not especially susceptible to erosion, a considerable amount of soil was being washed off the banks into the canal. There were reasons for this. One was the type of soil—generally sandy—through which the canal was dug. Also the hydrostatic head of water in the soil produced a flow of water laterally into the canal, which carried with it a certain amount of soil.

As a result, the plant was forced to put draglines into operation, dredging the canal at a cost of approximately \$60,000 a year.



Bermudagrass stabilizes the banks of the International Paper Company canal near Georgetown, S. C.

Note:—The author is information specialist, Soil Conservation Service, Spartanburg, S. C.



Mill yard of the International Paper Company at Georgetown, S. C.

In the spring of 1955, Steedly had occasion to consult with company officials about a matter concerning some of their other land. During the discussion, Steedly mentioned the canal and asked if the planting of grass to hold the soil on the sloping canal banks had been considered. While some thought had been given to erosion control, it hadn't occurred to them that such service and know-how was available from the Soil Conservation Service. They got in touch with the supervisors of the Georgetown Soil Conservation District immediately, discussed the matter with them, and asked for help with the project. The district in turn requested Steedly to work with the company engineers on the problem.

To make a long story short, the canal banks were seeded with a mixture of grasses including Bahia and bermudagrass, as well as winter ryegrass. About 500 acres of grass have been established. The grass has reduced bank erosion to such an extent that one dragline operating only part-time keeps the canal free of silt. This has resulted in reducing maintenance costs by approximately \$50,000 annually.

Company officials at International are delighted with results. In addition to the reduction of maintenance costs, the verdant banks of the canal add beauty to the countryside, which is good for public relations.

Furthermore, the canal serves as an excellent demonstration for farmers in the Georgetown District of how they can handle the drainage ditches on their own farms. Steedly pointed out that a uniform sod of grass on farm ditch-banks will do just as good a job for smaller landowners as it is doing for International Paper. Besides making maintenance easier, it will help with weed and brush control. With 453 miles of drainage ditches on farms in the Georgetown District, the savings thus effected would be no small item.

TREES ARE A CROP.—The Soil Conservation Service recognizes that trees are a crop, and accordingly encourages the planting, protection, and proper care of trees where the land capability shows that to be the most suitable use for the sustained productivity of the land.

D. A. WILLIAMS, *Administrator,*
Soil Conservation Service

FERTILIZER PAYS ON RICH SOIL.—Some fertilizer tests at the University of Minnesota show that fertilizing may pay, even on highly productive soils. Proper fertilization boosted corn yields from 138 bushels to 159 bushels per acre. Fertilizer cost was \$12 and yield increase was about \$25 per acre, resulting in a net gain of \$13 per acre.

Nature Was Too Slow

A Washington Rancher Found It Profitable To Plant Adapted Grasses and Legumes on Bare Land Because Natural Revegetation Was Too Slow.

By BERNARD M. OTNESS

NATURAL revegetation of denuded rangeland in a dry climate is uneconomical because it is too slow, in the opinion of Frank Lenzie, a cooperater with the West Benton Soil Conservation District in south-central Washington. He urges that all bare rangeland, especially that which is being retired from cultivation, be planted to adapted grasses and legumes at the earliest opportunity.

Mr. Lenzie operates a 26,000 acre ranch in the Horse Heaven Hills country south of Prosser, Wash. About 6,400 acres are cultivated with a wheat-summer fallow rotation. The remainder is grazing land. The ranch was acquired in 1935, but Lenzie did not assume full management of it until 1947. For the 30 years before that, he was with the Forest Service and Indian Service of the U. S. Government as a range specialist.

During World War II the livestock were sold, and the ranch was turned over to the Navy as a part of a gunnery range. During this interval extensive burns denuded the land of vegetation in several places. Soil blowing became severe in some of the burned areas, and sand dunes formed in places.

In addition to the burned-over areas, the ranch has several fields that were formerly cropped but were retired from cultivation. Most of this formerly cultivated land had only a sparse stand of desirable grasses on it, even though some of it had not been cultivated for 30 years.

It is mainly this abandoned cropland and the burned-over areas on which Mr. Lenzie has been working to reestablished a good stand of desirable grasses.

One field of particular interest on the ranch is pointed out by Mr. Lenzie. This field cultivated and cropped to wheat over 30 years ago was abandoned and not reseeded to grass. The field has been grazed in conjunction with the adjacent native range since that time. One might think that the natural spreading of native bunchgrass seed would have revegetated the area by now. But the sparse stand established and the preponderance of undersirable vegetation attests to the fact that from the economic stand-point nature was just too slow.

Examination of the abandoned, formerly cultivated field shows a composition of sagebrush, wild flax, fleabane, plantain, rabbitbrush, annual bromes and fescues, a small amount of Indian ricegrass, and needle-and-threadgrass. Only a sparse stand of the most desirable native forage species, beardless wheatgrass, is present, and that is only in limited locations. The undisturbed rangeland adjacent to this field has an excellent stand of beardless wheatgrass with very little of the undesirable plants.

On the formerly cultivated field at least 7 acres are required to produce a month's feed for a cow. The native range, because of the



Frank Lenzie stands in a native pasture that has never been cultivated. In the background is an area that was retired from cultivation about 30 years ago. This plot is still covered mainly with sagebrush and inferior grasses.

Note.—The author is work unit conservationist, Soil Conservation Service, Prosser, Wash.



Sand dune on the Lenzie ranch that has been controlled by planting yellow wild ryegrass.

desirable vegetation, will produce a like amount of feed on 3 acres. This, says Mr. Lenzie, bears out the need for seeding abandoned fields to adapted perennial grasses. The best time to make this seeding, he continues, is the year of abandonment, so as to take advantage of a relatively weed-clean seedbed and stubble that will assist in controlling wind erosion.

In speaking of grasses to plant, Mr. Lenzie points out that the grass must be adapted to the soil texture, climate, and general site. He has had particularly good results spot planting

yellow wildrye (*Elymus flavescens*) on sand dunes, the original seed of which was gathered from a dune area several miles distant. He started planting the seed on the dune areas in 1950, and he plans to continue doing so until all dunes have been stabilized.

Another good sand-stilling grass he finds well adapted to the Horse Heaven area is thickspike wheatgrass (*Agropyron dasystachyum*). This grass is doing an excellent conservation job by protecting sandy soils from blowing. Without this protection the finer particles in the soil would be blown away leaving the coarser sand that might grow into problem dunes.

Because of the mounting problem of reestablishing a ranching operation after the war, Mr. Lenzie resigned from the Indian Service in 1947. He and his wife, Ethel, moved directly to the ranch and started anew the development of a sheep and cattle operation in the country that interested them the most.

By careful selection of breeding stock and the use of registered Hereford bulls they now have a well-rounded ranching enterprise. Seven wells that serve 6 large fenced pastures have been developed. Approximately 80 acres of sand dunes have been spot-seeded to sand-stilling grasses; and, 44 miles of fence have been constructed. The extra water places and fences enable Lenzie to control his livestock, rotate and defer grazing, and put into effect a long-range plan to increase the desirable vegetative cover. Livestock now can get to water from any place on the ranch by walking less than $1\frac{3}{4}$ miles. As an additional precaution, critical blow areas are fenced to exclude grazing.

The Lenzies have a keen awareness of the conservation responsibility entailed in the management of 26,000 acres of land. Holding past gains and planning for future ranch improvements requires constant attention. They find that low annual precipitation, which averages just over 7 inches, precludes any quick conservation gains. Careful planning, giving full consideration to nature's limitations, is necessary. The conservation job is not yet completed but the goal is in view now that son-in-law, Arthur Berg, and his teen-age sons, Frank and Barney, have moved to the ranch.



Mr. Lenzie stands near a three-pasture watering arrangement.

Saving The Seepage

By MORRIS B. SIMPERS

NOT enough irrigation water! That was the problem confronted by water users of the Hill irrigation ditch in southeastern Wyoming 2 years ago.

Cooperators with the North Platte Valley Soil Conservation District, in which the ditch is located, decided to do something about this. Doing the work themselves, with the technical assistance of the Soil Conservation Service, the water users have modernized their irrigation ditch. The project now has been in use for two seasons. Results have been so successful that additional improvements are planned.

"The water has not been turned out of the ditch during the irrigation season to remove weeds and moss, and every farmer has received his full allotment of water for the last two seasons," reports Howard Hood, who is the last man on the ditch to receive water.

The problem faced by the water users in the

Note:—The author is area conservationist, Soil Conservation Service, Torrington, Wyo.

spring of 1956 was a serious one. A section of the canal approximately 3,000 feet long is built on a fill. The area is very sandy and erodes readily, which has resulted in the fill section becoming almost level. The water flowed so slowly that weeds and moss clogged the ditch. This made it necessary to shut off the water while the weeds and moss were cleaned out during the height of the irrigation season. Water loss through seepage was heavy, and several times breaks in the ditch were caused from rodent damage.

Walter Schumacher, a supervisor of the North Platte Valley Soil Conservation District and a Hill Ditch water user, and Frank Berry, another water user, were determined to correct their ditch problem in the spring of 1956. They



Irrigation water is delivered to the end of the line without loss from seepage or interruptions to clean out weeds and rubbish.

requested technical assistance of the SCS technicians assisting their district.

Then they learned from the Agricultural Stabilization and Conservation Committee of Goshen County that organized irrigation districts are not eligible for cost-sharing payments. However, they found that a group of individuals on a voluntary basis were eligible. Schumacher and Berry got other water users to agree voluntarily to finance the farmers' share of the cost of modernizing the irrigation ditch.

Soil Conservation Service engineers planned the project. This called for filling the old canal, eliminating one 4-foot drop structure, building a new grade, and constructing a new canal, of which 3,900 feet would be lined with concrete.



Installing concrete lining with a slipform in the Hill irrigation ditch.

When the grade was completed, ditches were plowed and water turned in to soak the grade for 48 hours. The new ditch was made with a large ditcher pulled by two farm tractors. A road grader was used to blade away the loose dirt.

Supervisors of the North Platte Valley Soil Conservation District purchased a large steel slipform, and rented it to the Hill Ditch water users to do the concrete lining job. The form had to be remodeled to pour a 4-inch concrete lining as had been planned. Ready-mix concrete was obtained locally, and 750 cubic yards were used to line the 3,900 feet of ditch. The finished ditch is 24 inches wide at the bottom, 42 inches deep, and has 1½ to 1 side slopes.

The Hill Ditch water users now are so well pleased with the results of this job that they plan to concrete-line other sections of the canal.

Permanent Farm Roads

By ROY R. BECK

FARMERS in western North Carolina's Haywood Soil Conservation District have found it pays to make their roads permanent farm improvements.

They are doing this by building roads properly and then seeding them to grass. Such roads are valuable as access roads for fighting forest fires, for trucking out wood cut during woodland-management operations, and for hauling lime and fertilizer to hillside pastures.

Wildlife, especially deer and turkey, benefit from the grasses growing on stabilized roads in wooded areas. In fact, when roads are spaced closer than 1,000 feet, the grassed areas of such roads adds up to about 2 percent of the area, which is considered practical for wildlife management. Some pulpwood operators are spacing their roads as close as 500 feet apart.

How valuable is a farm road? In Haywood County, the soil conservation district supervisors estimate farm roads cost an average of \$425 a mile to build. Landowners and wood-



Gully caused by poor construction and maintenance of a farm road in Haywood County, N. C.

using industries spent almost \$100,000 building roads in Haywood County during 1956.

Yet many temporary farm roads have been bulldozed out during the past few years with no thought of their ever being used again. Badly rutted and abandoned after a year or two, they become impassible gullies, creating serious problems on hillside pastures and in woods.

Haywood district supervisors, with the help of agricultural workers, contractors, and men from wood-using industries, developed these



Properly constructed and grassed farm-access road that has withstood 3 years of use without deterioration.

Note:—The author is work unit conservationist, Soil Conservation Service, Waynesville, N. C.

recommendations for building and maintaining farm roads: (1) Have road surveyed before construction. (2) Keep grades under 10 percent. (3) Avoid dips where water can collect. (4) Slope roadbed out from hillside 6 to 8 inches. (5) Have minimum turning radius of 35 feet on cutbacks. (6) Do not build roads close by and parallel to stream channels. Such roads act as diversions for the whole hillside and soon wash out. (7) Build water-turnout cross ditches on diagonal to increase ditch grade for self-cleaning. (8) Space cross ditches no farther apart than: 300 feet for grades up to 5 percent, 100 feet on grades of 5 to 10 percent, or 50 feet if road grade has to be over 10 percent.



A cross ditch, supported by locust poles, on a farm logging and pasture road that has given satisfactory service for 4 years.

Grass seeding recommendations include: (1) Apply 2 tons of lime per acre. (2) Prepare seedbed by dragging with harrow or other suitable equipment. (3) Apply 800 pounds of 8-8-8 fertilizer per acre. (4) Seed 20 pounds of Ky. 31 fescue and 1 pound of inoculated white clover seed per acre. (5) Seed 2 bushels of rye on fall seeding or oats on spring seeding. (6) Mulch roadbanks with pine boughs or other material.

WORLD POPULATION.—The population of the world may rise to 4 billion or more by 1980 and to 6 or 7 billion by the end of the century, according to a new United Nations study on future population trends.

The Main Crop Is Quail

By J. B. EARLE

QUAIL is one of the main crops on the Okeetee Plantation near Ridgeland, S. C. There are more than 1,000 bicolor lespedeza strips on this 60,000 acre plantation, each about one-eighth acre in size. The strips are located and laid out according to a definite pattern and plan. The main purpose of the bicolor is to furnish quail food.

Rice, beef cattle, horses, trees, and ducks are also provided for on this plantation; but, the quail crop takes second place to none.

Technicians of the Soil Conservation Service, cooperating with the Beaufort-Jasper Soil Conservation District, helped the plantation owners develop a conservation plan, after a soil survey had been completed. W. W. Neely, SCS biologist, took a prominent part in working out the plan, because the plantation owners wished to stress wildlife conservation as well as wise use of the soil and water resources.

Some land in capability class III-w was too wet to grow crops, yet not wet enough for ducks. SCS technicians helped lay out a drainage system for this land, and it is now planted to bicolor lespedeza and other feed crops for quail.

But ducks are also provided for at Okeetee. Dikes, ditches, and water-control structures

Note:—The author is assistant State conservationist, Soil Conservation Service, Columbia, S. C.



One of the more than 1,000 bicolor lespedeza strips on the Okeetee Plantation.

have been installed to make rice growing feasible on some of the nearly level land. After the rice is harvested, with a combine, enough grain is left on the ground to provide a great deal of duck food. Mr. Frank E. Baldwin, Jr., who leases 120 acres of the plantation for rice growing, estimates that his combine leaves at least 5 percent of the rice on the ground.

Lease arrangements formerly required that one-fourth of the rice crop be left for the ducks and not be harvested. But, it was found from studies and observations that there is probably more food for ducks when the entire ricefield is combined. Those seeds left after combining fall to the ground and are eaten by ducks. Whereas, that rice not combined is eaten mainly by bobolinks (ricebirds), and blackbirds.

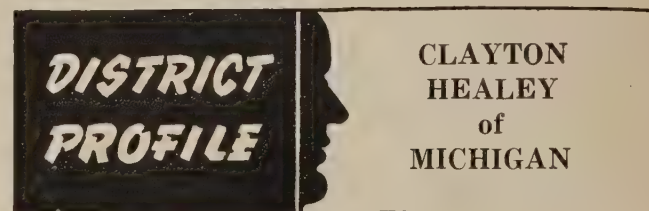
After the rice is harvested the field is flooded. Water is provided from a well, 300 feet deep. A 25 horsepower electric pump is used to lift the water from the well to a reservoir at the rate of about 1,600 gallons per minute. The water flows from the reservoir to the rice fields by gravity.

The rice is planted from March 15 to April 15. It is harvested from August to October. In some cases, when the rice is harvested early and the fall is late, a second growth will produce another crop of rice which is left for the ducks.

Even though timber is secondary to quail on this farm, pines are not overlooked in the farm plan. The woods are divided into blocks. A systematic cutting plan is followed with a con-

sultant-forester marking the trees to be cut. Some thinning is done each year.

N. B. Bass, superintendent of the plantation, has a small herd of beef cattle which are provided with almost year-round pasture. A herd of riding horses are also kept, mainly to be used in quail hunting.



ONE of the goals of Clayton Healey, chairman of the Charlevoix Soil Conservation District in Michigan, is to get all farmland assessed according to land capabilities. This method of tax assessment was outlined in the 1956 Michigan tax manual and was the springboard for district action. This district felt that the tax assessment of many areas in Michigan was erratic and, believing that assessment of land according to capability was the soundest method of appraisal of land, immediately adopted it as one of their projects.

On behalf of the district, Clayton has worked on this project since 1956. He was instrumental in getting together necessary research data and meeting with interested groups to encourage acceptance of the program. Recently, Marion Township accepted the method on a trial basis.

Clayton contends that this assessment program does not mean an increase in taxation but a system of equalizing the tax burden. The soil surveys of the Soil Conservation Service can be used as the main base on which tax assessment of land is founded. Consideration is also given to distance from market, economics, and crops grown in the area.

Healey has the first basic soil conservation plan in the district. He has been a district director since the Charlevoix Soil Conservation District was organized in 1948 and has been chairman of the district for the past 9 years.

This 42-year old farmer was operator-manager of the Healey Dairy for 14 years until selling out in 1955 to devote his entire time to his 300-acre farm. At present this farm, plus



Ricefield on the Okeetee Plantation.



Clayton Healey

100 acres that he rents, supports a 60-head commercial beef cow and calf enterprise as well as 31 milking cows and replacements. The farm also has an 11-acre cherry orchard.

His basic farm plan calls for a 5-year crop rotation along with rotational grazing of pasture. In addition, a variety of soil conservation practices have been established on the farm—contour strips, diversions, waterways, tree plantation of red and white pine, multiflora rose plantings, and windbreaks. Clayton states the diversions he established back in 1949 saved the orchard from severe erosion, and the grass waterway was a must for the outlet of the excess water from the diversion. The contour strips have held erosion to a minimum on his most intensely cultivated cropland.

Once a barren hillside, the plantation of red and white pine has put on excellent growth and has created an ideal habitat for wildlife. Proper management of this plantation calls for thinning, and in the process Clayton has harvested a few Christmas trees.

He has seeded a mixture of ladino, alsike, brome, and timothy in his lowland areas where adapted. This mixture plus a well-balanced fertility program has resulted in better quality and quantity of pasture for his livestock.

The results of all these practices have greatly

encouraged neighborhood participation in the district program.

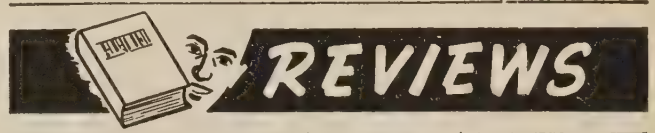
Clayton isn't alone in practicing and teaching conservation. Agnes, his wife, has been active in the Women's Auxiliary of Soil Conservation Districts Association. Both Mr. and Mrs. Healey evaluate the present situation but look to the future as well for their three children. His goal is to leave the farm in a better condition than when he started farming so that his children may continue to carry on the farm enterprise.

Healey believes an essential part of the district's program is the cooperation of the district with local, State, and Federal agencies. Evidence of this can be seen in the soil- and water-conservation projects in the schools in cooperation with the Parent Teachers Association and the Michigan Education Association. District dealer relationships have recently spurred a program of free soil tests that will aid any landowner in applying the correct fertilizer. The district has cooperated with the East Jordan Future Farmers of America and East Jordan Advisory Council in establishing soil-runoff plots for educational purposes.

Healey has assumed statewide responsibility in the districts program. He has been regional director of the State Association of Soil Conservation Districts for 6 years, and has burned plenty of midnight oil, in attending other directors' meetings, giving them advice and information.

Besides his duties as director he is an active member of East Jordan school board, honorary member of the East Jordan Future Farmers of America, member of the Agricultural Stabilization and Conservation Committee, and member of the Forestry Committee of East Jordan High School.

—BILL GRIMM



LEARNING ABOUT SOIL AND WATER CONSERVATION. By Adrian C. Fox and George E. Rotter. 64 pp. Illustrated. 1958. Lincoln, Nebr.: Johnsen Publishing Co. 75¢.

THE authors call this "A text-workbook for use in social studies or language arts, grades 5 to 8." That seems to be a good description of the book, and it is probably the best book of this kind on conservation that has ever been placed on the market.

The first part of the book is written in story form, yet is packed with useful information about soil and water and their conservation. The latter part is a workbook aimed at encouraging students to think and write about conservation.

The illustrations, both photographs and cartoons, are excellent. The subject matter is sound, since it was prepared by a conservationist and an educator. The story is delightful. This should be a best seller in schools where conservation is taught by integration into social studies and language arts.

—TOM DALE

COTTON. By Harry B. Brown and Jacob O. Ward. 566 pp. 3rd Edition. Illustrated. 1958. New York: McGraw-Hill Book Co. \$12.00.

ONE but has to read the list of references at the end of each chapter to recognize that the authors have incorporated the latest information in this edition. In recent years, considerable advancements have been made in the culture, mechanization, improvement of varieties, and the processing of cotton. This edition has dealt with these aspects very well.

The organization of this edition is much the same as the previous editions. However, some rearrangements have been made to improve the general plan. Specialists in the various phases of cotton production, marketing, and process-

ing contributed in the preparation of their particular specialties.

This is a good reference and text for colleges, and specialists in colleges and industry, who are interested in all the aspects of cotton.

—B. D. BLAKELY

FREE FISHING RIGHTS.—Finley Creek provides the municipal water supply for the city of LaFayette, Ala. The local work unit conservationist and district supervisor worked closely with the city officials in locating this water supply in the Finley Creek Watershed. Service engineers collaborated with the city engineer in planning and constructing the dam for impounding the water supply. The district supervisors and the work unit conservationist enlisted practically every landowner in the watershed as a district cooperator, and the work unit conservationist has helped prepare basic farm plans for almost every farm in the watershed.

Recently the mayor of LaFayette expressed his appreciation to the conservation farmers of the watershed with the following letter:

The city of LaFayette deeply appreciates your cooperating with the Finley Creek Watershed Project and commends you for the soil conservation you have done in the past. We would like to encourage your continued cooperation with the Piedmont Soil Conservation District in the practice of good soil conservation.

As a token of our appreciation we are happy to give you this permit which entitles you and your immediate family to fish in the city lake.

Sincerely yours,
CITY OF LAFAYETTE
H. D. Huguley, Mayor

P. S. This letter is your permit. Be prepared to present it to the game warden or city officials upon request.

MORE FARM TELEPHONES.—An annual survey by USDA's Crop Reporting Board shows 2,684,000 farms in the U. S. with telephone service in 1957. This is an increase of 70 percent since 1940, 24 percent since 1950, and 6 percent since 1955.

NOVEMBER 1958



SOIL CONSERVATION

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION

EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

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TOM DALE, Editor

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A LETTER TO THE EDITOR.—

DeSmet, South Dakota.
August 18, 1958.

Dear Mr. Dale:

We are enclosing a copy of a letter recently sent to the Superintendent of Documents ordering 50 one-year subscriptions to the magazine, SOIL CONSERVATION.

It has been the policy of this district to provide all new cooperators with a year's subscription. Including this order, the Kingsbury County Soil Conservation District has, to date, provided 895 one-year subscriptions during the ten years of the district's existence.

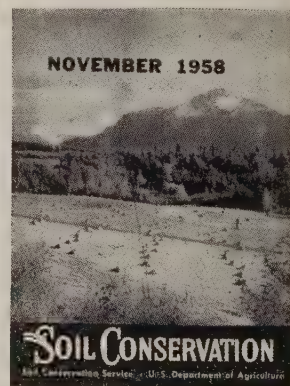
As evidenced by its long continuity, we have always felt that this project of ours is well worth while.

Sincerely yours,
Harold C. Fritzell, chairman,
Kingsbury County Soil
Conservation District

Dear Mr. Fritzell:

We thank you and the other supervisors of the Kingsbury County Soil Conservation District for your vote of confidence in SOIL CONSERVATION Magazine.

—EDITOR



FRONT COVER.—Barley field in Alaska with Pioneer Peak in the background.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

The Story of a Picture

By VIRGIL S. BECK



THE sun rays beam through an opening in the clouds in the late afternoon; they focus on a hillside with contour strips of wheat stubble interspersed with strips of grass. The camera catches the scene and gives us one of the most widely used pictures of soil conservation produced in this generation.

This classic photograph was made in the early fall of 1952 by Robert B. Branstead, then regional photographer of the Soil Conservation Service at Portland, Oreg. The scene was a conservation farm in northwest Idaho. Branstead had spent most of the day at Moscow, Idaho, waiting for the rain and drizzle to cease, so

that he could take some suitable photographs of conservation practices in that locality. By mid-afternoon, he decided that the perpetual rain and drizzle might stop and permit some photography. He traveled to this scene and waited. The sun did break through the clouds and this picture was the result. Branstead says this was the only usable picture he made all that day. But this was enough.

This striking soil conservation scene soon attracted national attention. The National Association of Soil Conservation Districts adopted it as an illustration for "An Eleventh Commandment" poster issued in connection with Soil Stewardship Week. Soil conservation districts throughout the country liked the poster

Note:—The author is information specialist, Soil Conservation Service, Berkeley, Calif.

with the intriguing picture. The districts purchased thousands of copies of the "Eleventh Commandment" poster. Today, the poster can be found on the walls of schoolrooms, in ministers' studies, in banks, soil conservation district and SCS offices, and in numerous other places throughout the country.

"Where was the picture made?" is the question that has been voiced by many thousands as they were thrilled at their first view of this spectacular soil conservation scene.

So, here's the answer to the oft-voiced question.

The picture was taken on the 240-acre farm of Charles A. Bower, about 10 miles north of Kendrick, in northwestern Idaho. Bower, a bachelor, resides with his widowed mother, Mrs. Charles J. Bower, on the 100-acre home place where he was born 38 years ago.

Bower and his mother became cooperators of the Latah Soil Conservation District in December 1946. As Bower went about the job of applying soil- and water-conservation practices on the 100-acre home place, he often paused to observe the terrific erosion damage on the adjoining 240-acre farm.



Charles A. Bower.

This is the Palouse country. The Palouse is a strip of steep hills, about 100 miles long and 50 miles wide, created by wind-blown soil in Idaho and Washington. The soil is highly fertile but is extremely erodible. Many slopes of 30 percent or more are farmed. Unless vegetation protects the steep slopes from swift runoff, water-erosion damage can be terrific. Deep gullies are cut in the sloping hillsides, and farming soon becomes difficult or impossible.

This was the type of erosion that Bower had been observing on part of the adjacent 240-acre farm as he worked on the home farm in the late forties.

Then one day in the fall of 1950 the telephone rang in the Soil Conservation Service work unit office at Kendrick. Manning Onstott, who provides technical assistance to farmers in this part of the Latah Soil Conservation District, answered.

"Hello, Manning. This is Charley Bower. I've just bought that 240-acre eyesore, so now what can I do with it?"

"Contour strip it," was Onstott's reply.

Bower signed a cooperative agreement with the Latah district, and Onstott assisted him in drawing up a conservation plan. The conservation program provides for a 3-year rotation of grain, legumes, and grasses in a stripcrop pattern. Strips vary from 150 to 200 feet in width on the steep slopes, depending upon the degree of slope and practicability of farming.

Before Bower started his conservation program on the steep slopes, he and Onstott made an accurate measurement of soil losses from water erosion. They figured the average was 90 tons per acre. This year another measurement was made. According to the best estimates, the use of soil- and water-conservation practices has cut soil loss to an average of 5 tons to the acre.

Meanwhile, crop yields have more than doubled. When Bower acquired the farm in 1950, the wheat yield was only 25 bushels to the acre. In 1957, the yield was 55 bushels to the acre. Barley and oats produced only a half-ton to the acre in 1950, but last year the yield was a ton to the acre.

Bower keeps a small herd of milk cows, so uses the legumes for hay, and seed is harvested for sale. He now has 30 percent of his farmland in grasses, such as brome and fescue along

with red and alsike clovers and alfalfa. He plans to continue contour stripcropping and crop rotation, and he will construct waterways and seed them to grass.

"I'm convinced that contour stripping and crop rotations will solve the erosion problem on the many sloping fields in this part of the country," declares Bower.

But Bower is more than a conservation farmer. He is vice-chairman of the Latah Soil Conservation District board of supervisors. He is the lecturer for the Deary Grange. He likes to hunt and fish and is an expert taxidermist,

as heads of moose, elk, deer, and other mountings in his home will attest. He spends hours in his farm workshop where he makes many of his farm machinery attachments. And he also instructs in square dancing.

So, this is the story of the famous conservation picture made on Bower's farm in 1952. Today, a print of the picture on the "Eleventh Commandment" poster will be found in every classroom in the Latah County schools, in all the banks, and homes of ministers, thanks to the efforts of the women's auxiliary of the Latah Soil Conservation District.

Balancing An Overstocked Ranch

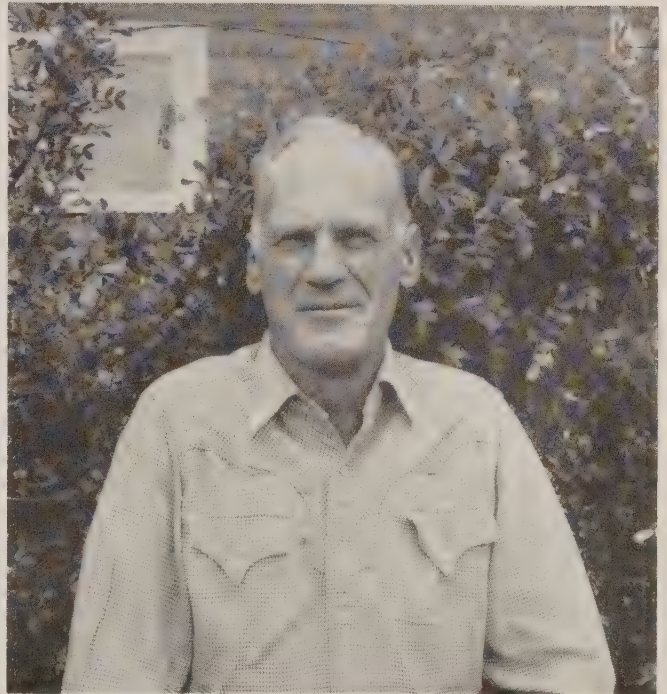
By ORVILLE SPARROW

HOW do you balance an overstocked ranch? You don't! You cut the stocking down to where the cattle and feed are in balance; then, if you use good range management practices, you can build the stocking back as the range is improved. I learned years ago that this is the only way to build up a ranch, and I have always preached it.

About the time I was elected to the board of supervisors of the Beaverhead Soil Conservation District a rancher asked me how he could build up his range to carry the number of cattle he wanted to keep. He explained that his family was growing up; he had two boys in college and a boy and girl in high school. He had to buy some new ranch equipment. Insurance payments, taxes, and interest had made it necessary to borrow operating money. He figured he was running enough cattle to meet his obligations, but that he had to overstock his ranch to do so.

I told him that I didn't think it could be done. But he still seemed interested in becoming a cooperator with the district if the assistance we bragged so much about would help him balance his ranch to his cattle. I explained that

putting two combines in a field would not double the yield of wheat, and likewise, more cattle wouldn't increase the pounds of beef he could get from his ranch unless the food was there.



Orville Sparrow.

Note:—The author is a supervisor of the Beaverhead Soil Conservation District, Wiseman, Mont.

I also tried to explain to him that the Soil Conservation Service technicians helping our district were not magicians. They were just a group of well-trained men with a lot of experience in engineering, farming, range management, soils, and irrigation. Not only that, they had back of them specialists in each of these fields that constantly supplied the technicians with the latest technical developments and information. The services of these men were available at any time and they frequently had been called upon to help solve problems peculiar to Beaverhead County.

He had met Jess McWilliams, our SCS plant material specialist, and was thoroughly impressed by his knowledge of grasses. I explained how Jess covered the whole State of Montana, as well as Wyoming, and was not only an authority on native Montana vegetation, but had done a lot of work with introduced grasses as well as with those developed at the SCS grass nurseries in the country. I told him about the new grass called Mandan ricegrass that Jess had helped develop from a cross between green needlegrass and indian ricegrass. Also, how Jess had made some of the seed available to Art Christensen, a cooperator with our district, and that the largest stand in existence was in Beaverhead County.

As best I could, I described the abilities and duties of Bob Ross, SCS range conservationist and Roger DeLand, SCS agronomist who, in conjunction with Mel Morris of the State university, did the work on the effect of fertilizer on dryland intermediate wheatgrass in the Bitter Root area.

He said he doubted if he had the time to do all of the things that many men might dream up, but he still would like to raise enough grass to hold his present bunch of cows together.

I told him there would be a conservation plan set up that would embody the thinking of these men and the benefit of their experience. He would probably never talk to but one technician, and he would be the one assigned to the final preparation of his plan.

I explained that there would be a range survey and a soils map made of his deeded range and pastures. The range survey would not only determine the present carrying capacity of which the land was capable but also its potential capacity. The soils map would be a map with complete description of the various types of soils found on the ranch and the proper treatment for each one of them. Included with the plan would be a composite aerial photograph of the entire ranch, showing the various meadow and pasture units as they are fenced and the



Preparing a seed bed on native sod for planting improved grasses on the Sparrow ranch.



Native sod (left) and intermediate wheatgrass (right) on the Orville Sparrow ranch.

acreage of each. On this photograph all of the topographic and cultural features of the ranch would be plainly visible.

The only part of the plan that would require much of the rancher's time was the written portion that covered the many problems of operation, their solution, and the projects that would be agreed upon to increase grass production on the ranch. By the time the plan had reached this stage the technician would be pretty well aware of the possibilities and have the necessary information on range and pasture conditions and soils and irrigation. He and the technician would then sit down and discuss the problems and proposed projects. When they were in accord with a solution to any one of the problems, it would be incorporated into the plan.

Knowing he had several projects in mind to increase his grass production, I told him this was the time and place to discuss these projects, and to decide if they were of sufficient merit and how best to put them into execution.

He was particularly interested in reseeding dry rangeland. I suggested that he go over each site he had in mind and get the technician's reaction and his advice on the grass or grasses best suited to each, the best way to

prepare a seed bed, and how to seed it. In fact I told him so much about so many things he finally asked for an application to sign before I got started again. As he signed it I thought about those extra cattle, but I thought I had better let the technicians explain that little fact of life.

As time passed I couldn't tell from the manner of the technician who had helped him make up the plan that anything out of the ordinary had happened, and I was too much of a coward to ask him.

This fall I met this rancher for the first time since the big sales talk. He seemed pleased to see me, so my curiosity overcame my guilt feelings and I invited him to have a cup of coffee.

Out of habit, and it seemed a perfectly safe question under the circumstances, I asked him if he had started to feed yet. His eyes lighted up like a pinball machine and he was away. Among many other things he said that for the first time since he had been ranching, he had lots of fall feed and would be able to rustle his cows until the snow got so deep they could no longer find the grass. Not only that, this was the first fall he had had any grass left on his summer pastures. He admitted that when his



The Sparrow ranch headquarters.

conservation plan had been delivered he looked at the proper stocking rates that had been assigned to his pastures and was tempted to give the whole thing up.

During the range discussions the technician had pointed out many possibilities that the rancher was not aware of. He could see where the same principles would apply to some situations the technician had overlooked. Perish the thought! His enthusiasm was sufficient so that he finally quit worrying about the suggested stocking rates and went to work on the outlined projects.

With the changes in ditches on the meadows he made better use of his irrigation water and he simplified some haying operations. Fewer contour ditches replaced the existing downhill ditches. More extensive use was made of waste water that ran off the meadows onto the pastures. He had been using a large wrango pasture, a holdover from horse days, for his bulls. A rough corner in one of the meadows was fenced off for them, and as a result he cut two bents of hay in the wrango pasture. One of his large fields had some native pasture fenced in with some hay meadow. He put a fence between the meadow and dryland, and increased the amount of pasture available at the time of the year when he needed it most. The added forage from this field and the increase from the use of waste water made enough forage to enable him to defer one meadow and not pasture it until quite late in the season. He chose the one with the greatest variety of reseeding sites. Each year he broke up as much land as he had time for and seeded it.

Where a new ditch made it possible to irrigate a new piece of ground, he broke this up and seeded it for meadow. He planted timothy, alsike, Sherman big bluegrass, and birdsfoot trefoil in this meadow. The first two were sown together and the other two sewn in pure strands. All did very well.

The dryland he seeded to crested, intermediate, tall, and Whitmar wheatgrass, Russian wildrye, green needlegrass, and Sherman big bluegrass. The bluegrass had not been recommended by the technician for dry land but it had done so well under irrigation he wanted to try it under range conditions. These seedings all were successful.

Since he had been able to defer this field each year, the new seeding was protected and the native grass was allowed to mature, with a consequent increase in volume, density, and vigor. With this field in reserve he could plan on from several days to weeks of good rustling for his cows after he previously had to start feeding hay. He was now cutting ample hay for his cattle, and his pastures were no longer being abused. Each year the increase in both hay and forage was gratifyingly evident.

I asked him if he planned to increase the number of cattle now that his ranch had caught up with what he had been running. He said, "You talked me off that hook once and I am not going to get into the position of having to listen to it again. From now on I am going to keep my hay and pasture ahead of my cattle."

CONTRACTOR AIDS.—Several soil conservation districts in New York State furnish their excavation contractors with hand levels and folding rulers without charge. No contractor is allowed to start shovel work without these tools.

The rulers are graduated in tenths. Grade stakes every 50 feet give a 5-foot cut "mark" which the operator measures down from.

Benefits of this gift service: Work quality is up, required supervision time is down. Farmers gain because there is less "over excavation"; there's almost no doubling back to correct the grade. Shovel operators, down in the ditch to check depth, more often check side slope and top width, too. Soil Conservation Service technicians still make that all-important final check.

—CHARLES R. BARNETT, JR.

RUNOFF—HOW FAST AND HOW MUCH

No. 39

This is the thirty-ninth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By J. B. BURFORD and J. H. LILLARD

WHY does the dam have to be so high and the spillway so large? Then, a farmer may also ask, "Why doesn't my pond fill with water?" These familiar questions are becoming increasingly critical in present-day agriculture.

The soil- and water-conservation programs are effective in reducing runoff losses, but there is a limit to the amount of water that the soil can retain for crop use. Thus, a large portion of the water received during the high rainfall periods is lost to ground water aquifers. On the other hand, the higher crop yields resulting from improved plant varieties, better fertilization, and good management increase water requirements, often to the point where supplemental supplies are needed.

During recent years the Soil Conservation Service has assisted farmers in the design and construction of approximately 20,000 ponds in Virginia. Most of these were for the usual farm needs; but, more recently many irrigation water supply ponds have been constructed.

A recent study of agricultural drought conditions in Virginia by Van Bavel and Lillard¹ indicates that the number of drought days (days in which there is insufficient soil moisture available to insure maximum plant growth) to be expected 5 years in 10 will range from 20

to 70, depending on the water-holding capacity of the soil and location in the State. Under the same conditions the driest year in 10 will have 40 to 90 drought days.

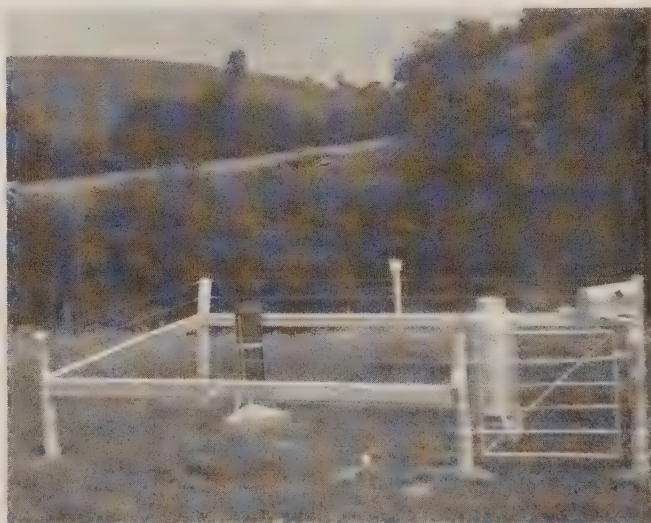
Obviously, under such conditions the use of irrigation will increase and result in an even greater demand for dependable surface water supplies. Various authorities, guided by the present trends, predict that our national water requirements for all uses will about double within the next 10 to 20 years, and that agriculture, through increased irrigation of farmland, will soon be using one-eighth of all available water.

Therefore, we will have to keep building "high" dams and "large" spillways until there is enough hydrologic data from agricultural watersheds to properly evaluate the effect of various agricultural programs, soil characteristics, topography, and other conditions on runoff losses. Then, more economical designs for the retention structures may be possible.

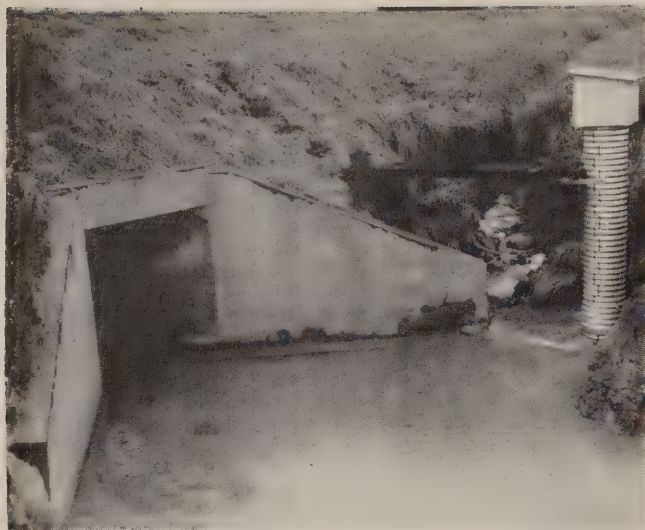
Technicians engaged in the current watershed development work and the flood prevention programs on agricultural watersheds are also faced with many problems and unknowns. They

Note:—The authors are, respectively, project leader, watershed technology branch, Agricultural Research Service, and professor of agricultural engineering, Virginia Agricultural Experiment Station, both of Blacksburg, Va.

¹ Van Bavel, C. H. M., and Lillard, J. H. *Agricultural Drought in Virginia*. Agricultural Experiment Station, Technical Bulletin 128. 1957.



A typical precipitation measuring station, located in Montgomery County, Va.



A concrete highway culvert, 4 ft. x 4 ft., used as a stream gaging station below a 152-acre watershed in Halifax County, Va.

are confronted with the tasks of estimating the maximum peak discharges and the total amounts of runoff for the extreme conditions from the areas being controlled and developed.

These present trends in agricultural watersheds have emphasized the need for improved methods of predicting hydrologic information for areas in the size range of about 50 acres to a few thousand. The best methods and procedures for determining watershed information can only be developed by measuring actual conditions and determining the relationship be-



A double 6 ft. x 6 ft. concrete highway culvert being used as a gaging station to measure stream flow from a 760-acre watershed in Montgomery County, Va.

tween the different variables. Continuous runoff and rainfall records must be collected from areas in this size range, with special attention given to the various soils, topography, land use, climatic conditions, and other variables.

Long-time streamflow records are available for most of the large rivers. Similar data have been collected for several very small areas; but, only a few areas in the critical, intermediate-size range of 50 acres to a few thousand acres have been studied. The periods of high water from these intermediate-sized watersheds are so short that velocity measurements are not easy to obtain, making streamflow determinations very difficult without the use of precalibrated controls. Precalibrated structures large enough to measure the maximum flows from these critical-sized areas are massive and expensive to construct.



A concrete dam used as a stream gaging station for a 2,850-acre watershed in Pulaski County, Va. This dam was constructed in 1913 and was adapted for stream gaging in 1957.

This problem of measuring runoff from these areas can be solved to some extent by instrumenting existing structures for which the relationship between streamflow depth and discharge can be determined. The most common structures in this category, in Virginia, are standard box-type highway culverts made of concrete. With the addition of a low flow control, these culverts are excellent flow measuring devices, provided they have desirable upstream and downstream conditions.

The hydrology research program in Virginia

is taking advantage of these existing structures and expanding activities to include several watersheds in the intermediate-size range. Five new areas were instrumented during 1957, and 5 additional watersheds are scheduled for instrumentation in 1958. Nine of these new areas, ranging in size from 152 to 1,980 acres, are above highway culverts. The tenth area, of 2,850 acres, is above a large concrete dam built, in 1913, below an ice pond. These 10 areas, in 9 different locations—the mountains, valleys, and Piedmont area counties—are each being instrumented with two or more automatic precipitation measuring stations and one streamflow measuring station. Local observers are contracted to service the recorders and make certain observations.

In most cases the culverts can be calibrated from model studies made at the Agricultural Research Service Outdoor Hydraulic Laboratory at Stillwater, Okla. Culverts with structural variations sufficient to complicate calibration are being modeled and studied at the laboratory.

Watershed hydrology research in Virginia is a joint project of the ARS and the Virginia Agricultural Experiment Station, cooperating with the SCS and the Virginia Department of Highways.

The SCS assisted in making a survey of possible experimental watersheds in Virginia during 1956. About 130 areas above an existing rateable structure or a possible weir location were investigated. These watersheds ranged in size from 75 to 3,000 acres, and are areas from which long-term streamflow data are badly needed. The new watersheds being included in the hydrology research program were selected as the 10 choice areas among the group investigated.

The goal of this program is to obtain, with minimum cost, information needed to more accurately compute the hydrologic information required to design water supply and control structures on the intermediate-sized agricultural watersheds.

Radio Broadcast Aids Tree Planting

By ELMER L. WORTHINGTON

THE Three Rivers Soil Conservation District of North Dakota uses the local radio station to help them plan and execute their spring tree-planting program. The tree planting extends over about a 3-weeks period in the spring, and it takes considerable detailed planning to carry on the job efficiently. One important part of this planning is the routing of the tree-planting machine and crew so that backtracking is held to a minimum.

Farmers who have trees to plant must have the land properly prepared before the planting is done. In order to insure that the site is ready before the planting machine and crew arrives, it was found that the use of the local radio station was very effective. This radio station relays the routing of the tree-planting machine for each day as a public service.

Each morning at 7:30 a soil conservation aid from SCS gives the radio announcer a list of farms that will be planted that day. Then the announcer, on his regular morning program at 8:30, reads off this list, which gives the order in which the plantings will be made. If, for some reason, such as rain or extremely windy weather, the crew cannot plant that day an announcement to this effect is made in a later broadcast.

Soil conservation district personnel really like this system as it saves them time and money. Farmers like it because they know when to expect the planting crew. This practice not only makes the tree-planting program more efficient, but it advertises the tree-planting practice to everyone in the listening area.

This system was started 3 years ago by Gordon Brackett and Corliss Nelson, SCS technicians assigned to that district. Ed Balkke, editor of the *Walsh County Record* at Grafton was glad to cooperate with the district on his daily news broadcast over radio station KROX, Crookston, Minn., from its Grafton studios.

Several farmers, after hearing the routing

FISH AND TIMBER IN ALASKA.—The fishing industry of Alaska brings in an income of about \$79 million a year. The timber industry, second only to fishing, yields about \$35 million annually.

Note:—The author is woodland conservationist, Soil Conservation Service, Bismarck, N. Dak.

for the day, have called in to request that some trees be planted on their farms as the crew goes by. It has become a habit for farmers or the farm wife to listen for the routing schedule.

Proof that such a system is effective was given when one farmer refused to plant his trees on a certain day because his name was not mentioned during the broadcast.

\$'s From Coastal Bermuda

By R. H. HOLLEY

COASTAL bermudagrass is proving to be one of the most profitable crops on the farm of Quinton and Braddy Rowell, cooperators with the Orangeburg Soil Conservation District in South Carolina.

In 1957, the Rowell brothers bought 60 feeder cows in the early spring. The cows were placed on 30 acres of 2-year-old coastal bermudagrass pasture that had been established on rather light, sandy soil. The cows grazed for

4 months and were sold in late August. Profits from the cattle were \$30 per head, or a total of \$1,800.

In addition, the Rowell brothers cut 2 tons of hay per acre from this pasture during the summer and fall. Half of the hay was given in payment for having it cut and baled. The other half was sold for \$25 per ton. The sale of the hay paid nearly half the cost of the heavy fertilization given the bermuda field.

Before grazing began the Rowell brothers applied three-quarters of a ton of limestone and 500 pounds of 3-12-12 fertilizer per acre. In addition, 500 pounds of ammonium nitrate was applied per acre in 2 different applications. Total cost of the lime, fertilizer, and nitrogen came to \$56 per acre. Although this initial cost seemed high it carried 2 cows per acre for 4 months and produced 2 tons of quality hay per acre.

The Rowell brothers started their conservation program several years ago. They started with a soil- and water-conservation plan, which they prepared with the help of SCS personnel. The steeper, lighter fields were planned for sericea lespedeza and coastal bermudagrass.

In commenting on this field, Quinton said, "We made more profit on coastal bermudagrass on this light, sandy land than we had been making from cotton on good class I land."

Note:—The author is work unit conservationist, Soil Conservation Service, Orangeburg, S.C.



Quinton Rowell examines coastal bermuda growing on light, sandy soil.

Conservation On The Plains

The First Signers in South Dakota of a Great Plains Conservation Contract Have a Balanced Program of Soil and Water Conservation with Plenty of Wildlife Habitat.

By LES ALBEE

LAURENCE BERGNER and his father, Emil, signed the first Great Plains contract in South Dakota, March 24, 1958. Their 1,834 acre livestock farm is located in Brule County, 12 miles south of Chamberlain, S. Dak.

To carry out their 4 year Great Plains contract, the Bergners' agreed to plant an additional 9 acres of trees, construct 2 more miles of level terraces, continue their conservation crop rotation on 150 acres, manage crop residues on 28 acres, and plant tame grasses on 11 acres. They will also carry out proper range use on 1,360 acres, construct 250 rods of cross fences for better distribution of grazing, pit 70 acres of rangeland, seed 50 acres of depleted range to native grasses, and construct 3 additional stockwater dugouts. Lawrence feels that he can speed up the conservation treatment of their lands by cost-sharing under the Great Plains Program in addition to assistance received from the Agricultural Conservation Program Service and the soil conservation district.

"A Great Plains producer can plan his conservation operations years ahead and be assured of needed cost-sharing, as soon as the practices are completed. This is the most complete conservation program we've had yet to help farmers and ranchers make adjustments in land use and to speed up needed treatment of their lands for protection against soil and water losses," Lawrence said, summing up his comments on the benefits to farmers and ranchers of the Great Plains Conservation Program.

The Bergners' Grand View Angus farm consists of about 1,360 acres of native rangeland, 150 acres of cropland, 260 acres of hay and tame pasture, plus the wildlife areas and farmstead.

Lawrence first learned about soil, water, and wildlife conservation from his father. Emil Bergner became a cooperator with the Brule-Buffalo Soil Conservation District in 1944. He began a conservation program which Lawrence is still working to complete. Lawrence took over active operation of the farm in 1946 when he returned from the Navy.

"But we don't feel we'll be through applying conservation practices to our farm even when we have completed this Great Plains contract," Lawrence asserted before the ink was dry on the papers he and his father had just signed.

When you first approach the Bergner farm, you are impressed with obvious signs of good management of soil and plant cover and conservation treatment of the crop and rangelands. The first field you see is a luxuriant growth of



Lawrence and Emil Bergner (seated left to right) sign their Great Plains contract while SCS men look on.

Note:—The author is assistant State conservationist, Soil Conservation Service, Huron, S. Dak.

crested wheatgrass and alfalfa on terraced land, providing excellent soil protection on the 3 to 5 percent slopes.

Turning into their driveway, you see wide, unmowed strips of smooth brome on each side, making a haven for nesting pheasants and the young birds.

Emil's and Lawrence's homes, their gardens, and the feedlots are literally buried in trees. They have established 10 acres of windbreaks for protection against the cold sweep of winter winds and storms and the hot blast of searing south winds in July and August. But that isn't

all! In addition to being a haven for wildlife, the Bergners and their neighbors harvest large quantities of fruit, berries, and nuts from these windbreaks. There you'll find apples, apricots, cherries, sand cherries, raspberries, plums, buffalo berries, walnuts, and other edible fruits and nuts.

Emil Bergner started planting trees as soon as he became a district cooperator in 1944. Between the rows of trees or shrubs he planted two rows of sorghum to protect the young transplants from hot winds in the summer and to hold snow in winter. This practice has been



When 2 inches of rain fell in 20 minutes on the Bergner farm there was no runoff from the terraced pasture of crested wheatgrass and alfalfa (above), while runoff and soil loss was great from a neighbor's field across the road (below).



so successful that Lawrence still employs this design of protecting the young trees and shrubs with one row of corn and one row of cane, sudangrass, or milo for the first 3 or 4 years. These plantings also provide food for grouse and pheasants in the winter. Catching and holding snow, too, reduces tree damage by rabbits. Ten acres of windbreaks now protect the buildings and livestock in the feedlots. Nine acres more are planned as part of their Great Plains plan.

The Greater South Dakota Association awarded Lawrence an expense paid trip to the State college conservation short course in 1954 in recognition of his outstanding achievements in soil and moisture conservation. Lawrence was one of three State winners in the 1956-57 Izaak Walton League wildlife hab-

itat contest. He is an assistant supervisor of the Brule-Buffalo Soil Conservation District.

Some proof of the effectiveness of the Bergner's conservation program was observed by SCS employees on July 18, 1958, when nearly 2 inches of rain fell in 20 minutes. This flash downpour was absorbed or controlled without damage in terraces on Bergner's crested wheat-grass-alfalfa pasture.

In contrast, on adjoining land across the road, where corn was listed up and down the 3 to 5 percent slope, the water was led off down the rows to the low point where it collected, overtopped, and washed out several rows of corn. The silt-laden water then overtopped the county road and was lost from this cornfield, taking much topsoil with it.

Better Forage, Less Grain

Massachusetts Dairy Farmers Increase the Quantity and Quality of Hay and Pasture Through Conservation Practices and Save Money on the Grain Bill.

By EDWARD G. KONIECZNY

RAYMOND G. HOWES and his sons have increased their production of top-quality hay by 40 tons through pasture improvement, drainage, diversion construction, and strip-cropping on their 196-acre, 70-cow dairy farm at Ashfield, Mass. In addition, they have cut their grain bill by \$400.

Mr. Howes and his sons, Ralph, Merton, and Emory, obtained these production benefits after developing a farm conservation plan. They started the plan 8 years ago with help from Soil Conservation Service technicians assigned to the Franklin Soil Conservation District.

Building a 600-foot diversion with farm tractor and plows was the first job. The diversion kept excess water from spreading over a 4-acre field below. With excess water removed, the Howes were able to reseed the field. They



Ladino clover in a diversion channel is inspected by Ralph Howes (left) and Ed Konieczny.

Note:—The author is work unit conservationist, Soil Conservation Service, Greenfield, Mass.



Ralph Howes (right) and Ed Konieczny observe one of the six diversions on the Howes farm.

worked the field for seeding in alternating contour strips about 120 feet wide. They limed, manured, and fertilized the strips before seeding.

The Howes first planted sundangrass for silage and to smother weeds. They planted an alfalfa mixture after harvesting the sudangrass. The first harvest of alfalfa hay showed a 4-ton increase over previous yields. Diverting excess water from the field and stripcropping brought the increase.

"The diversion worked the way the technicians said it would; so we decided to put in another," Ralph said.

Over a period of 4 years the Howes have installed more than a half mile of diversions. They have stripcropped 40 acres.

"The thing we like most about our diversions is that they allow us to get on the land sooner in the spring, and we don't lose any land as a result of them," Ralph said. "We can work our land and seed it to legumes that produce more and better feed for our cows.

"I figure we have increased our yields by a ton per acre and have reduced our grain bill by about \$400 because we're getting higher quality hay," Ralph added.

The most recent conservation job was the improvement of 2 acres of pastureland. The Howes undertook this project to replace 2 acres

of land lost by the building of a new highway through a part of the farm.

Using a bulldozer, the Howes built 800 feet of V-type drainage ditches in the 2 acres. The total cost of bulldozer work and picking of stone and debris was \$400.

"Liming, fertilizing, and seeding cost another \$120," Ralph said. "If we had to buy the hay to replace the pasture, I figure we would have to pay \$50 per ton. At 3 tons per acre, the value of hay produced on the 2 acres would be \$300. On that basis, this project will pay for itself in 2 years."

The Howes farm has won numerous awards. The farm has placed among the top three in the county Green Pasture Contest during 3 years of participation. It won the Franklin Soil Conservation District conservation award in 1953.

Ralph Howes is chairman of the soil conservation district governing board and vice chairman of the Massachusetts Association of Soil Conservation Districts.

FEDERAL LAND IN ALASKA.—More than 99 percent of Alaska's vast area—covering 586,400 square miles—is land now controlled by the Federal Government.

BRITISH AGRICULTURE.—The annual agricultural output of England in 1957 was 63 percent above the pre-war (World War II) level.

What Soil And Water Conservation Means To A Dairyman

By C. T. SMITH

EVERY dairy farmer knows, or soon finds out, that an abundance of succulent grazing is a "must" for milk production. Grain and concentrates are essential, but grass (in the form of grazing, silage, and hay) tips the scales toward the credit side of the ledger.

For many years we have known the value of fertilizer. Ever-increasing rates of application are being recommended—and used. These and many other basic principles, we know or think we know. Yet, in too many cases, the need for more and more acres appears to be a limiting factor.

Additional acres, for the most part, are out of the question. In the past 15 years our best agricultural land has been reduced by 3 percent through diversion to other uses—roads, industrial developments, housing projects, airports, and so on. Population is increasing at an explosive rate. This means fewer acres available per person.

We are living in a fast-moving world. We could not stop progress even if we wanted to.

Note:—The author is a supervisor of the Newberry Soil Conservation District, S. C. This article is a digest of a talk given at a recent meeting of the South Carolina Association of Soil Conservation District Supervisors.

We have the choice of keeping in step or of being forced out of the picture.

We are assembled here because of our favorable convictions for the soil- and water-conservation program.

I would like to amend my assigned subject of "What A Soil and Water Conservation Program Means To A Dairy Farmer," by adding two words, "Any Farmer."

The program, when deliberately worked out by the farmer and the Soil Conservation Service technician, is a blueprint of the foundation and of the frame work for farming. The rest of the structure may be varied by prevailing conditions and circumstances. The foundation and framework must be sound and durable.

The dairy farmer has tried practically every recommendation offered in his efforts to obtain ample feeds economically. He has found the answer in the soil- and water-conservation program. We are enjoying the fruits of technical information reduced to practical application. It means much to us to know the ability, or capability, of the soils of our farms. This one thing alone saves much time and expense. For example: It may take years to find out by the trial and error method why seeding deep-



Pasture, pines, and a farm pond on the C. T. Smith farm.

rooted crops on land with plastic subsoil is doomed to fail. One might try repeatedly and not understand the cause of failure, especially since one's neighbor is growing the same crop with success on land that looks similar but has a different soil type.

In our series of dry years, the program has brought out our dependence on water. Irrigation helps—it pays. But ample moisture without the need for irrigation would mean more profit. Conservation workers are struggling hard to convince farmers that rainwater must be kept on the field. Our soil is our greatest water reservoir, but hard-baked dirt does not absorb much water.

A soil- and water-conservation program means more grass for feed, more grass to hold soil in place, and more grass to turn back into the soil. Until we get enough organic matter turned into the soil, we may expect to suffer from droughts and to continue to depend on irrigation.

We cannot hope to have the required rainfall every 5 to 7 days throughout the growing seasons. Our total rainfall is more than sufficient to grow our crops. The distribution and the inability of our organically starved soil to retain water is our problem. The sooner we get around to practicing grass-based rotations, the more effective our rainfall is going to be.

Someone has said: "It's not the water we use but the water we lose—it's the rain we save that counts."

Your SCS technicians know the meaning and value of a grass-based rotation. Perhaps most of you soil conservation district supervisors do too. All of us have the job of letting farmers know that fibrous roots improve soil structure, increase the moisture-holding capacity and productivity, and regulate soil temperature.

What Does The Soil And Water Conservation Program Mean To A Dairyman? It means, among other things, GRASS. Grass for grazing, for the silo, for the barn loft, and grass for the soil for its improvement and water-holding capacity. It is a slow process, but it will give us a foundation and framework for farming.

Editors are invited to reprint material originating in this magazine.

DISTRICT PROFILE

HAROLD FRITZEL
of
SOUTH DAKOTA

THE Kingsbury County Soil Conservation District of South Dakota has adopted as its motto: "As the soil is conserved, so prospers the land." A chief proponent of the motto is Harold Fritzel, chairman of the board of supervisors.

Instrumental in helping organize the Kingsbury district in 1947, Fritzel has served on the governing board since that time. He has the distinction of being the first cooperator and board chairman of the district. Probably of greater importance is his application of the 15 soil conservation practices included in the conservation plan developed for his 418-acre farm to demonstrate that he believes in practicing what he preaches.

Fritzel, 51, is a 1931 graduate of Iowa State College with a B.S. degree in agricultural economics. Following graduation, he was associated with various farming enterprises. He devoted 11 years to managing farms and State institutional land in Iowa. It was during this period that he became interested in soil conservation, in working with soil conservation groups, and in serving as delegate to several conservation tours and gatherings.



Harold Fritzel.

Returning to South Dakota to farm, in 1945, he embarked on his present diversified farming program of corn, brome-alfalfa, and small grain, while also maintaining a herd of registered Angus cattle. He became the first farmer in the county to establish terraces and to install sprinkler and flood irrigation along with some land leveling.

Fritzel's activities are many and varied. He has been a 4-H club leader for 12 years. He is on the board of directors and serves as treasurer for the County Crop and Livestock Improvement Association and was instrumental in establishing a 10-acre demonstration plot for testing seed stock. As a member of the South Dakota Reclamation Association he has been on their programs a number of times. He helped organize the Kingsbury County Fair board and serves as treasurer. In addition to serving as chairman of the Kingsbury County Soil Conservation District board of supervisors, he is State area vice president.

He has been the recipient of two gold medals from the Greater South Dakota Association for outstanding work in soil- and moisture-conservation and has been appropriately recognized as a tree farmer under the South Dakota Tree Farm System.

Under Fritzel's and the other supervisors' leadership, the Kingsbury district, 10 years ago, initiated an educational program that includes yearly: issuing special soil conservation editions of local papers, awarding 1-year subscriptions of SOIL CONSERVATION Magazine to all new cooperators, conducting annual supervisor tours, and holding annual meetings of district cooperators.

No project is too large or too small for Fritzel and the Kingsbury board. Primarily at his instigation, the De Smet (population 1,300) Chamber of Commerce extended an invitation to the State Association of Soil Conservation Districts to hold their annual convention in DeSmet in 1958. This 3-day affair had always been held in the larger cities of the State heretofore, as larger facilities were necessary for an attendance that varied from 300 to 400. With the district's county seat town awarded the convention, Fritzel was designated as general chairman by other members of the board.

It is typical of the energetic Fritzel that when one skeptic questioned the advisability of such a small district and town attempting to sponsor a convention of this magnitude that he replied "We'll give them a convention they'll never forget."

—KARL F. ZIEGLER

Convenient Fishing

Fayette County, Georgia, Prints Map Showing the Location of Farm Fishponds Open to the Public.

By ROY A. GRIZZELL, JR.

FISHING in farm ponds has become a great sport in Fayette County, Ga. And it has created a profitable business for many of the farmers on whose land the ponds are located. Altogether, the "take" in fishing fees by pond owners of the county was around \$60,000 last year, and the fishing business is still growing.

Less than 15 years ago the only fishing in the county was from four old mill ponds, and the

Note:—The author is field biologist, Soil Conservation Service, Decatur, Ga.



Pond fishing promotes the fish bait business in Fayette County, Ga.

fishing was not very good in these. Today, there are 309 properly constructed farm ponds, and nearly all are stocked with fish. The pond-construction program is largely a result of the soil- and water-conservation program of the Fayette County unit of the Towaliga Soil Conservation District.

F. M. Satterfield, SCS work unit conservationist, has worked long and patiently, and often on his own time, to promote this pond fishing program. He helped design most of the ponds and gave technical advice on how to stock, fertilize, and manage the ponds for good fishing. The results have been gratifying, not only to Satterfield and the soil conservation district supervisors, but also to the pond owners and the sportsmen of the county who like to fish.

Most of the ponds were originally intended for watering livestock. But almost without exception the pond owners also wanted fish. The U. S. Fish and Wildlife Service furnished most of the fish for stocking the ponds.

As the fish became numerous and larger a few owners started charging for the privilege of fishing in their ponds. This custom spread until many of the ponds became public fishing grounds.

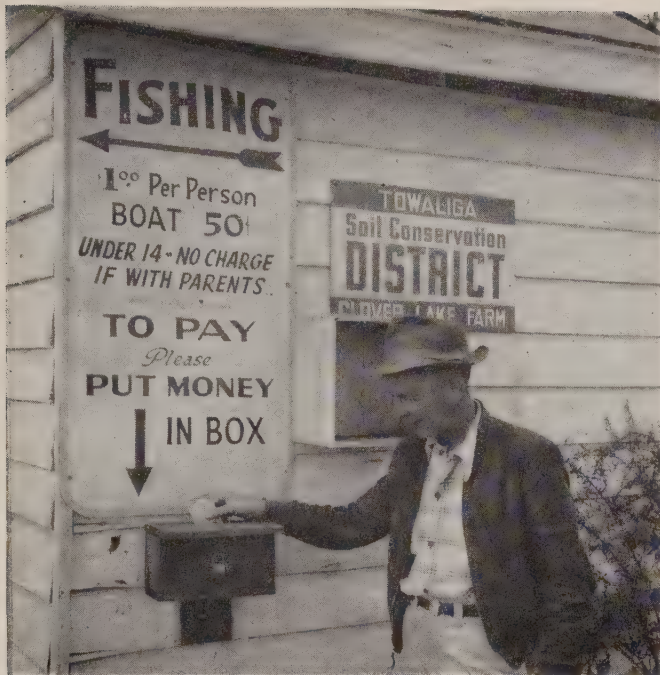
Three methods of charging for fishing privileges evolved. Some farmers charged a fee of \$1 or \$1.50 per day, with the fisherman stopping by the owner's house to pay the fee. But there were disadvantages to this, because it often meant that the owner was roused before daylight by some ardent fishermen. The club fishing plan was adopted by some pond owners, whereby a fisherman would pay a flat fee for a permit to fish during a given period—usually a year. The fee most often asked for a year's fishing rights was \$30.

In recent years the "honor system" has been adopted by most pond owners. Under this system the owner puts up a locked box with a slit in the top near the pond. Any fisherman may deposit the required fee in this box and proceed with his fishing without further bother to himself or the pond owner. Some pond owners have a supply of small envelopes at the box, on which the fisherman writes his name as he deposits the fee. This enables the pond owner to determine who his customers are.

As the pond fishing fever grew in Fayette County, Mrs. Frances Reeves decided that both farmers and sportsmen might appreciate further promotion of the program. She approached



A local merchant points out a good fishing pond to a customer in Fayette County, Ga.



The honor system of collecting for fishing privileges is used by most fish-pond owners in Fayette County, Ga.

Satterfield with the idea of getting up a county map showing the location of farm ponds open to public fishing. The idea caught on. A meeting was called of interested pond owners and the map developed. The printing of the map was financed by small block advertisements on the lower part of the sheet. In addition to showing the location of fishing ponds, a short description of each pond is printed in a box around the edges of the map. These maps are distributed and displayed widely, especially in sporting goods stores and public places where fishermen are likely to congregate.

The preparation of this fishing map has now become an annual affair. More and more pond owners are participating in the program. A special meeting is held each year for all pond owners who wish to have their ponds placed on the map. The featured speaker at such meetings usually is a biologist who discusses fish-pond management, including fertilization and weed control.

When the map publication was first started, some pond owners were afraid the competition from increased publicity would hurt their business. Actually it has worked out the other way. Each year sees more ponds added to the program, but the fishermen continue to come in increasing numbers.

Many farm pond owners are making more money from their pond acreage than any similar area on their farms. In addition to the \$60,000 contributed by fishermen directly to the pond owners each year, bait dealers, sporting goods dealers, gas stations, stores, and ice-houses have all benefited. Everybody seems happy about the widespread pond-fishing business in Fayette County, especially the fishermen who can now find some of the best fishing in the State within a few minutes drive from their homes.

Chicago Scouts Plant Trees In Tennessee

By ALFRED D. SMITH

ERNEST S. HYMAN, scoutmaster of troop 968 of Chicago, Ill., takes his Boy Scouts to a different section of the country each year to study and practice soil conservation.

This year, he chose Celina, Tenn., one of the older communities on the Cumberland River.

This community is well-known for its early industry of logging and rafting down the Cumberland. Cordell Hull has related great memoirs about the vastness of this early industry.

Note:—The author is work unit conservationist, Soil Conservation Service, Celina, Tenn.



Boy Scouts of troop 968, Chicago, planting trees on the H. T. Dodson farm, near Celina, Tenn.

Celina, known as the home of Dale Hollow Reservoir and the holder of a record on trout fishing, was a natural selection for conservation study—to say nothing of the natural beauty of the surrounding area.

Upon Scoutmaster Hyman's arrival, his first comment was "Eureka!" So, he and the scouts contacted district cooperator H. T. Dodson in regard to their planting trees on his farm. Dodson immediately agreed to this. He had previously planned to plant the entire farm to trees.

He contacted the soil conservation district office for additional trees and planting bars, along with technical assistance.

Dodson expressed his thanks and appreciation to the Illinois Boy Scouts for planting his trees.

Tall Wheatgrass For Alkali Spots

By ROBERT G. CAMERON

TALL wheatgrass has been a boon to farmers in parts of western Kansas where alkali spots are common. This grass will thrive in alkaline soils. It is adapted to wet soils as well as to semiarid conditions, and it produces high yields of hay and makes a tolerable pasture, even on highly alkaline soils.

The first planting in Reno County, Kans. was on the R. L. Evans & Son farm in 1948. Mr. Evans and his son are cooperating with the Reno County Soil Conservation District and live southwest of Hutchison. The area planted was too wet to farm during wet years and too alkaline and badly crusted during dry years. The field was so alkaline that winter wheat would sprout, grow to 3 or 4 inches in height and then die. Some wheat plants might even head out but would not fill. Occasionally, milo maize would yield 5 to 10 bushels if the season was ideal. Weeds even found it difficult to grow. Prairie saltgrass was the only natural vegetation that could survive on these soils.

Tall wheatgrass was planted as a trial on 5 acres in September of 1948. The field was

Note:—The author is work unit conservationist, Soil Conservation Service, Hutchison, Kans.



Tall wheatgrass (above) on a severe alkali spot on the R. L. Evans farm near Hutchinson Kans., as it looked in 1949, one year after planting. (Below). The same spot 8 years later.



crusted enough to drive across with a small tractor and drill. Soon after planting, the soil was packed by a heavy rain and then began blowing. As soon as possible, the area was disked. All hope of a stand was abandoned. However, early spring brought excellent growing conditions, and the grass seedlings began springing up. By the next fall, a good stand was on most of the field. The few blank areas were redrilled.

The stand was considered a success by the end of the second year. Seed was harvested during the third season. The seed crop returned \$200 per acre. Mr. Evans, Sr. said, "That's more than the 5 acres made in the last 10 years." He

continues to use this field mainly for seed production.

The planting on the Evans' farm influenced some of his neighbors and other district cooperators to try tall wheatgrass on their farms.

Walter Peirce, Evans' neighbor, planted an alkaline area. His beef cattle used the grass on a rotation basis with brome grass and saltgrass pastures. Peirce has found that during normal rainfall, tall wheatgrass has a fairly fast recovery and works out well in a rotation program. Also, he has pastured the Evans' area to utilize the grass and hay after a seed harvest.

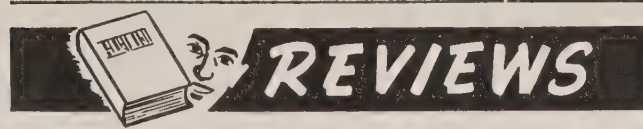
"Tall wheatgrass makes as good or maybe a little better hay than native grass," says H. L. Brownlee, Sylvia, Kans., another cooperator of the Reno district. "My cows will eat the hay even if it is old and stiff. It's pretty good pasture, especially in spring and fall, but not too good when making seed. If you have alkali ground, you need tall wheatgrass." Brownlee harvested about 200 bales of hay from a 7-acre field of tall wheatgrass.

Earl Thompson of Sylvia, when asked about his grass, said: "Well, I have 25 acres and have had 25 head of cattle on it and cut a hay crop. I have 13 acres of saltgrass that the cattle run on along with the tall wheatgrass. It's the best pasture I ever had, even though I have a Ninnescah river bottom pasture." Thompson estimates he harvested 340 bales that weighed between 75 and 80 pounds from his field after he had pastured it.

Thompson added, "I couldn't raise wheat, alfalfa, or sorghums on that field, so when the Soil Conservation Service technician suggested that I try tall wheatgrass, I figured, what could I lose? I'd seen the Evans' field and mine wasn't as bad as his."

THE SOIL AND WATER CONSERVATION JOB, to be fully successful, needs several other ingredients in addition to *technical assistance*. It requires *research*, to provide a sound scientific base for practices. It requires *education*, to communicate knowledge of new methods as rapidly as possible. And it often requires *credit or cost-sharing* help, to enable farmers and ranchers install needed conservation measures without delay.

D. A. WILLIAMS, *Administrator*
Soil Conservation Service



AMERICAN AGRICULTURE: Geography, Resources, Conservation. By Edward Higbee. 399 pp. Illustrated. 1958. New York: John Wiley & Sons, Inc. \$7.95.

A geographer's description of the agriculture of the United States might be expected to treat the subject with broad strokes. This one does just that, but with several unique angles.

Through the entire account runs a consciousness of the soil- and water-conservation problems of each area, and of the measures being taken to meet them. This is encouraging evidence that conservation is becoming accepted as a normal part of the agricultural scene, and not something special superimposed upon an occasional farm or ranch.

A part of the description of each agricultural region is an example of an actual farm representative of the prevailing type of farming. In each case, the author has selected a farm that is following a basic conservation plan. The land-use map illustrates the adaptation of the farming system to the land capability pattern of the area.

The introductory section of the book discusses land resources and their use, climate and agriculture, and soils and land capability.

The agricultural regions are discussed in two groups: the dry west and the humid east. In reversing the usual order of discussion, the author breaks with the traditional approach of following the course of land settlement from the Atlantic to the Pacific.

The text is clearly written and many charts and maps give a fresh view of the statistics.

The author is professor of geography and agricultural economics at the University of Delaware. Previous experience as a soil conservationist and agronomist in the United States and foreign countries equips him to write of the agricultural scene from first-hand knowledge. He has visited every one of the individual farms used to illustrate the regional descriptions.

—BEN OSBORN

CHANGE OF ADDRESS SHOULD INCLUDE OLD ADDRESS AND CODE NUMBER.

A Tree Grows In Minnesota

AT the meeting of the National Association of Soil Conservation Districts at Minneapolis in 1958, samples of soil from each of the Nation's 2,750 soil conservation districts were assembled. These samples were presented to the State of Minnesota.

On Arbor Day, May 2, 1958, a Norway (red) pine was planted on the State Capitol Grounds during an elaborate ceremony, with many prominent speakers. The soil samples from the soil conservation districts were used as the main filler around the roots of the pine tree.



Officers of the State Association of Soil Conservation Districts place soil from 2,750 districts around the Norway pine tree planted on the State Capital Grounds of Minnesota.



**DECEMBER
1958**

Soil Conservation

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION.

EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

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TOM DALE, Editor

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WILTED GRASS SILAGE.—Researchers at the University of Wisconsin have found that wilting the crop before putting it in the silo cuts losses and improves the quality and palatability of grass silage.

For 2 years they filled 2 silos with the same forage cut at the same time. The forage in 1 was wilted by leaving it in the field for 2 or 3 hours after cutting. The other forage went right into the silo from the chopper. In both years the wilted silage was better in all respects.

Seepage losses were high with the direct-cut silage, which had around 85 percent moisture when cut. Up to 40 percent of the weight put into the silo ran out, and with it went 10 percent of the dry matter ensiled.

Wilting cut the dry matter losses way down and also cut fermentation losses.

The wilted silage was consistently better in feeding trials. It was more acid and did not have the objectionable odor of high moisture silage. Cows ate as much as 25 percent more dry matter as wilted silage than as direct-cut silage.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—A shelterbelt planting provides cover for pheasants on the Lester Wolfe farm near Uniontown, Wash.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

A Guiding Hand

A Kentucky Farmer Supervises an Orphanage and a Soil Conservation District, Thus Helping Censerve Both Human and Soil Resources

By KENT ALVERSON

“WHEN you can't have the best, make better use of what you have,” says L. W. Murdock, Kentucky farmer. He teaches that philosophy to more than 20 orphan children who work and play under his supervision at Paradise Friendly Home, 15 miles southeast of Mayfield, Ky.

The same idea prompted an experiment in forestry, a few miles away, that has brightened the outlook for several thousand acres of poorer land in Graves County.

To see the connection between the two, you must know that Murdock, in addition to being a farmer and godfather to some less fortunate children, is also the chairman of the Graves County Soil Conservation District board.

Graves County, in western Kentucky, had been doing a lot about its conservation problems under Murdock's leadership the past 12 years. But one of its most vexing problems had gone unsolved. That was the question of what to do with 20,000 acres of land now covered with poor quality, scrub growth, hardwood timber.

In the main, this land is low value Brandon silt loam—extremely drouthy—with sand near the surface. Native trees grow so slowly that, according to research men, annual production ranges from zero to only 50 board feet of lumber per acre. In some places the trees don't even provide good ground cover. Yet, foresters contend that, when planted to some kinds of pine, this type of soil will produce 200 to 300 board feet of good quality lumber.

Recognizing this problem and the solution for it, the soil conservation district supervisors decided they should set up some observational areas and show people of the community what could be done.

Here was “orphan” land—neglected, abused, unused—because few people recognized its po-

tential. Soil resources wasted for want of a guiding hand!

Though Murdock probably didn't think of this comparison, his orphanage is also a test plot. Children are taken in from the poorest of backgrounds—out of tune with the world, and not knowing whence they came nor where they are going. Their talents are analyzed and they are directed toward the things they can do best.

They are taught to take an active interest in their community—the 4-H clubs and FFA, how to get along in society and make an honest living. And because of Murdock's keen interest—how to maintain the fertility of our soils.

No, Murdock was not making comparisons—but he was thinking of both his “children” and the land. Here was a chance to do something for the community and for his orphans at the same time.

“How about having my boys and girls lend a hand with the project?” he asked at the district's board meeting.

There were a lot of details to be worked out—where to get the trees, what would be the best place for a demonstration planting, and how to get rid of the old brush and scrubby growth.

In the end, the supervisors picked out one of the worst areas for the growth of hardwoods in the community—on a farm just a short way from Paradise Friendly Home. Average size of the standing trees was only 8 to 10 inches in diameter after 40 years of growth.

A 3-acre piece was chosen—along the road where it would be readily seen. With the help and cooperation of the Kentucky Division of Forestry, a complete reforestation job was done. As Warren Holt, Soil Conservation Service technician at Mayfield, decribed it, “We went in there and girdled and chemically treated every tree we found with the exception of the red cedar and a few good quality white oaks. Everything else was killed off.”

Note:—The author is information specialist, Soil Conservation Service, Milwaukee, Wis.

Then the "Friendly Home" crew went to work. "It was a year ago—in March," said Murdock. "The 12 older boys and I went in and did the actual planting. We spent about a day, planting by hand with spades, mattocks, and planting bars. We set out 3,000 trees—all loblolly and shortleaf pine. The State foresters called it a conversion planting from hardwoods to pine."

A lot more could be said of Murdock's efforts to bring a better tomorrow to the folks around him. Among other things, he has shown a great deal of enthusiasm for the new Obion Creek watershed program which involves a part of Graves County. This program is expected to increase yields and incomes on nearly 2,000 farms in western Kentucky and boost the standard of living for the whole area.

Murdock is a director of the Obion conservancy district. At a recent meeting he spoke of the urgency of getting farm planning and land treatment done in the subwatersheds. "If we as individuals and groups of farmers are finished with our part of the work, we can expect quicker help from the Government."

But it is his efforts with orphans and the teaching of conservation methods by doing on the acres surrounding his Paradise Friendly Home for which he is best known.

"My wife and I have kept homeless children for 25 years—ever since we were married," said Murdock. "But we didn't start operating the orphanage until 3 years ago. We think it is cheaper to furnish homeless children a good place to live and teach them to be useful citizens than to leave them in our slums or to pay taxes to support them in our penal institutions."

Paradise Friendly Home is sponsored by the Bell City Church of Christ, Farmington, Ky. Murdock built the first dormitory and the church helped feed and clothe the 10 to 12 children first accepted. But there were too many others "knocking on the door", as he put it, and it was decided to build a new dormitory which could accommodate around 35. At present there are 24 children ranging in age from four to 18 years.

The policy is to take under-privileged children—either boys or girls—and get them into the public schools at Sedalia. In addition, the



L. W. Murdock and the Paradise Friendly Home bus.

boys are given Vocational Agriculture training and the girls Home Economics training on the Murdock farm.

Help with the venture has come from many sources. The main source of support, though, comes from regular contributions of individuals and various congregations of the Church of Christ.

Murdock hopes to have the program largely self-supporting in the longrun—"if we can get a farm bought." Already they are growing a large share of their own food. And the children took an active interest in construction of the second home. Timber was donated on various farms and the boys did a pretty good job of logging, cutting, and hauling.

Murdock says, "We grind our own flour and meal here. We use only whole wheat flour. We find we can control the health of the kids about 90 percent with a good diet.

"We milk two cows and raise some beef, chickens, and eggs. We grow lots of vegetables and have a big patch of strawberries. We do have to buy oranges, apples, and fruit juices, but with the canned goods that are donated, our grocery bill is very light. By raising our own food we have better health, save money, and teach the children all at the same time."

There is no lack of opportunity to teach conservation, Murdock finds. He owns 143 acres, including 75 acres of woodland; his mother has 89 acres for which he is responsible, and a neighbor, Neal Brooks, donates the use of 92 acres including bottomland which can be cultivated.

Recently the Vocational Agriculture instructor from Sedalia joined Murdock in his conservation courses. "We got the boys out on an adjoining farm where the land had become severely gullied and eroded," Murdock said. "We explained first what had happened and how gullied land would affect them even if they lived on Broadway in New York City. We told them no Nation can stand economically with a depleted soil, yet tons of soil had left the place where we were standing. The "Ag" teacher ended with an explanation of how it could be helped with trees and sericea."

Murdock was the first farmer in the county to use multiflora rose as a living fence. The original plants came from Missouri, but he now raises his own plants from seed. He has made a



L. W. Murdock and three of the boys from Paradise Friendly Home planting a pine tree.

planting each year for the past 5 years and now has about 2 miles of hedge established.

Under his supervision, his "boys" regularly carry on reforestation and wildlife-area improvement projects. On one farm they cooperated with the Kentucky Department of Fish and Wildlife to "bring back" quail, rabbits, and other forms of wildlife to a 400-acre area with wildlife plantings and seedings.

IN SOUTH-WEST AFRICA the term soil conservation means better veld management and veld utilisation. As soil erosion is, as yet, not a serious problem, soil conservation is not an expensive undertaking. On the contrary, soil conservation and the investment of capital in improvements which make conservation farming possible, are sound business policy. As the desired pasture crops or their seed are present in most cases, the composition of the veld can be restored to normal and its carrying capacity developed to a maximum merely by improved veld management.

—Veldtrust

IMPROVED AUSTRALIAN PASTURE.—A 10-acre pasture in New South Wales, Australia, was grazed by 28 to 41 head of dairy cows from 3 to 5 hours daily for 9 months. The pasture was in excellent condition at the end of the period and the cows were producing well. A mixture of clovers and phalaris was used in seeding the pasture.

CONTROL OF AQUATIC AND BANK WEEDS

By F. L. TIMMONS and D. L. KLINGMAN

No. 40

This is the fortieth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

AQUATIC weeds which grow submerged in, floating on, or emergent from water are causing tremendous losses in irrigation and drainage canals, ponds, lakes, and marshlands. Closely related problems are weeds which grow at the waterline on ditch banks or on wet lands near marshes.

The demands for more water for irrigation, domestic and industrial uses, recreation, game and fish have made weed problems more acute and have made us aware of their growing importance. Along with the increasing awareness of the aquatic and bank weed problem has been the recent spectacular advances in herbicides, that has resulted in renewed hope that these weeds can be economically controlled and has stimulated increased research and action programs in that direction. Research has already developed a number of improved methods of control of aquatic and bank weeds, and there is reason to believe that many more problems can be solved through research.

Aquatic and bank weeds causes losses of at least eight types: (1) Sometimes aquatic weeds reduce the flow of water by as much as 97 per cent. Reduced flow causes high water levels in canals and streams that result in flooding,

seepage into adjoining areas, breaks in canal banks, greater water losses from evaporation, and inadequate delivery of irrigation water to farms or inadequate drainage of water from farms. In addition, reduced velocity of flow causes increased sedimentation, making necessary more frequent mechanical cleaning. (2) Floating and other aquatic weeds that break loose obstruct wiers, gates, and other structures and often create flood hazards during storms. Also, algae and fragments of other submersed aquatic weeds clog sprinklers in sprinkler irrigation systems. (3) Aquatic and bank weeds provide breeding grounds for obnoxious insects, such as mosquitoes. (4) They prevent economic uses of farm ponds and reduce recreational values of lakes and ponds by interfering with



A dense growth of parrot's feather, cattail, tule, and saltcedar clogs this drainage canal in New Mexico.

Note:—The authors are research agronomists, crops research division, Agricultural Research Service, Laramie, Wyo. and Beltsville, Md., respectively.



Rank growing narrow leaved cattail in a drainage canal of the Southwest.

fishing, swimming, boating, and hunting. (5) Aquatic weeds interfere with navigation of otherwise navigable streams. (6) The decaying organic matter produced by aquatic weeds cause objectionable odors and flavors, in potable water. (7) Emergent aquatic and bank weeds transpire tremendous quantities of water and cause serious losses in areas of water shortage. (8) Bank weeds prevent the proper inspection and maintenance of irrigation and drainage canals and shorelines of reservoirs.

Accurate figures are not available on the total monetary losses caused by aquatic and bank weeds or on the total costs of controlling these weeds in the United States. A few examples of such costs and of the extent of the problem, however, may indicate the economic importance of water and bank weeds. Annual losses from aquatic and bank weeds on the 130,000 miles of irrigation canals and laterals in 17 Western States totalled \$25.5 million according to a survey in 1947 and 1948 by the Bureau of Reclamation. This figure probably would be considerably higher now because of increased prices for farm products and the placement of about 8 million acres of new land under irrigation in the last 10 years.

Figures supplied by the U. S. Army Corps of

Engineers show that since 1939 over \$500,000 has been spent on the Potomac and Mohawk-Hudson Rivers in attempts to control waterchestnut. The Corps of Engineers also report that since 1905 over \$5 million has been spent in controlling water-hyacinth in Florida, Alabama, and Louisiana. These figures represent control efforts on relatively small areas, and in spite of these expenditures both waterchestnut and water-hyacinth are still with us.

In Arkansas, Drainage District No. 16 is spending \$5,000 to \$8,000 annually for mechanical control of water-stargrass in about 20 miles of drainage channel. This is \$250 to \$400 per mile for underwater cutting, the method used.

The Central and Southern Florida Flood Control District supported by Federal, State, and county funds, has a network of 500 miles of major drainage canals for which the annual operating costs for aquatic weed control exceed \$50,000. In addition, about \$30,000 was spent annually on aquatic weed control in the smaller drainage and irrigation ditches serving 15,570 square miles of agricultural land in southeastern Florida.

The Los Angeles Department of Water and Power reported the use of 135 tons of copper sulfate during the 1955 season for control of aquatic weeds in potable water supplies at a total cost of \$30,000. Multiplying \$30,000 by



Removing cattail and other weeds from a drainage ditch at a cost of about \$400 per mile.



Mowing of aquatic and bank weeds along canals gives temporary and partially effective control.

the large number of cities in the United States, which have aquatic weed problems in their potable water supplies, would give a sizable figure.

The traditional methods of controlling aquatic and bank weeds include handcutting or pulling, mechanical mowing, chaining, dragging, or crushing. These methods are still in use in many areas and in many situations, but they are slow and the present high labor costs make them very expensive. In most instances the hand and mechanical methods give only partial or temporary control. With these methods the best that can be done is to fight a defensive battle against aquatic and bank weeds.

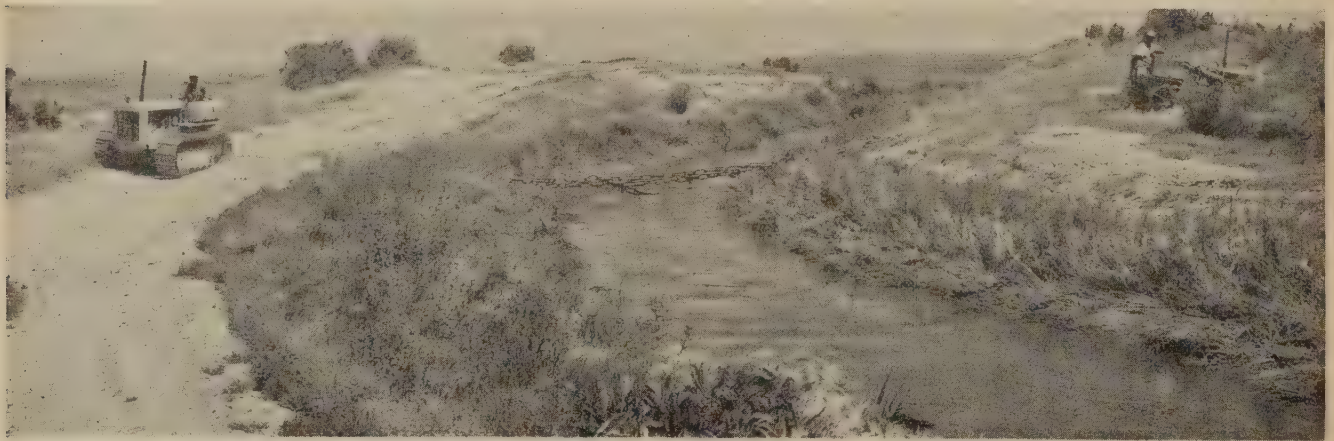
Research on control of aquatic and bank weeds has lagged considerably behind that on

control of weeds on crop and rangelands, and there is only a moderate research program underway. However, some experimental work on aquatic and bank weeds has been underway for about 10 years and several improved control methods have been developed. Investigations were begun in 1947 and 1948 by the Agricultural Research Service and the Bureau of Reclamation working cooperatively. Some experimental work had been done previously by a few State experiment stations.

The first improved method developed by the cooperative research was the discovery and development of aromatic solvents for the control of submersed aquatic weeds in irrigation channels. The use of these aromatic solvents or metylated hydrocarbons, consisting largely of xylene, has been increasing rapidly in the West since 1952 and totaled approximately 580,000 gallons in 1957. Extrapolations from comparative cost figures compiled by Manager Carroll F. Wilcomb of the North Side Canal Company, Jerome, Idaho, indicate that the use of this improved chemical method throughout the Western States in 1957 resulted in a saving of \$1,084,600 as compared with the cost of controlling submersed aquatic weeds by the previously used mechanical methods. Also, the weed control provided by aromatic solvents was much superior to that by mechanical methods.

Directions for using aromatic solvents for controlling submersed aquatic weeds in irrigation systems are given in U. S. Department of Agriculture Circular 971.

Aromatic solvents in mixture with gasoline and chlorinated benzenes are also being used



Chaining an irrigation canal to remove submersed weeds is a partially effective but temporary treatment. The use of aromatic solvents is replacing this type of mechanical treatment.



Aromatic solvent, used for killing submersed weeds in an Idaho irrigation canal, forms a milky emulsion as it mixes with the water.

successfully for control of submersed aquatic weeds in water-control canals in Florida. The recommendations for such use are given in Florida Agricultural Experiment Station Circular S-97.

Another improved method developed by the cooperative research of the Agricultural Research Service and the Bureau of Reclamation is the control of cattail by spraying with a low volatile ester of 2,4-D in a 1 to 20 oil-water emulsion (1 gallon of diesel oil to 20 gallons of water); 4 to 6 pounds of 2,4-D in a total volume of 150 to 300 gallons of emulsion is used per acre of cattail. The first spraying should be done just before cattail heads appear, with more treatments as necessary; usually about 3 applications over a 2-year period is required for complete elimination. The Bureau of Reclamation reports that the costs of eliminating cattail by this method range from \$24 to \$43 per mile of canal as compared with \$407 to \$418 for draglining—the most common mechanical method of controlling cattail.

More recently, research has shown that dalapon (2, 2-dichloropropionic acid) and amitrol (3-amino-1,2,4-triazole), alone or in combina-

tion, are effective in controlling cattail. While these herbicides are more expensive than 2,4-D ester in oil-water emulsion, this disadvantage is offset, at least in part, by three distinct advantages: (1) Dalapon and amitrol are effective in low volumes of 5 to 12 gallons of water per acre, hence, may be applied by airplane; whereas, 2,4-D is effective only when applied in high volumes of 150 gallons or more per acre. (2) Use of dalapon and amitrol involves less hazard of spray drift and volatile fumes to nearby sensitive crops. (3) One spray application of these chemicals each growing season usually will give as good control of cattail as 2 repeated applications of 2,4-D in oil-water emulsion.

Copper sulfate has long been used as an algicide. Recent research and experience by the Bureau of Reclamation and the Los Angeles Water and Power Department show that continuous application or frequently repeated applications of copper sulfate for control of algae also controlled or inhibited the growth of rooted submersed species. The chief disadvantage of copper sulfate is that it is toxic to many species of fish at concentrations above 1 part per million. The maximum tolerance limit of fish and



An irrigation canal in Utah with heavy growth of pondweed, anacharis, and algae (above) before treatment, (below) 6 days after treatment with trichlorobenzene.



the minimum concentration necessary for control of algae are too close together for extensive use of copper sulfate in ponds and lakes where fish are desired.

Treatment with sodium arsenite at 4 to 10 ppm of arsenious oxide (AS_2O_3) has been widely used for many years to control submersed aquatic weeds in lakes and ponds. Most species of fish will tolerate as much as 11 to 12 ppm of arsenious oxide without injury. Hence, removal of aquatic weeds from ponds and lakes without serious loss of fish is possible. The chief disadvantage of sodium arsenite is its toxicity to human beings and warm-blooded animals and the consequent necessity for extreme care in applying and handling this chemical. Publications giving directions for the use of sodium arsenite for control of aquatic weeds are available and should be closely followed.

In recent years, the research departments of several manufacturers of herbicides have diverted part of their attention to the development and screening of chemicals for aquatic weed control. More than 20 new herbicides now show definite promise for control of aquatic weeds, and many more compounds are being evaluated by commercial and public research agencies.

The development of promising new aquatic herbicides and the increased public awareness of the serious aquatic weed problem in lakes and ponds has resulted in expanded research and action programs for control of these weeds by State departments of conservation. Many State departments have been active in this field. Also many State experiment stations have active experimental programs under way. The Fish and Wildlife Service and the Soil Conservation Service also have extensive action programs and are conducting research on the control of aquatic and bank weeds.

Since 1957, there has been considerable expansion of investigations by the ARS. Existing cooperative research programs in Montana, Washington, and Wyoming were enlarged. New investigations were begun in Arkansas and Florida in cooperation with the State experiment stations and other agencies. The cooperative research program of the ARS and the Bureau of Reclamation at Denver, Colo. was reactivated and enlarged to conduct greenhouse and laboratory evaluations of aquatic herbicides. Also the ARS has made contract research funds available to the Alabama Agricultural Experiment Station for screening of a large number of chemical compounds for effectiveness on aquatic weeds and for tolerance by fish. All aspects of this expanded program are coordinated and integrated with research being done by other agencies to provide an effective total program in developing improved methods of control.

Many problems on control of aquatic and bank weeds remain to be solved. We need more effective and less expensive methods for controlling submersed aquatic weeds in irrigation canals, especially in large canals with capacities above 100 cubic foot per second. We need safer and more lasting methods of controlling algae and other submersed aquatic weeds in ponds and lakes. And we need less expensive and more

effective chemical methods for control of cat-tail, sedges, rushes, and other rank-growing emergent aquatic and bank weeds.

We have promising leads for solving many

of these problems, and it seems logical to predict that many improved methods of controlling aquatic and bank weeds will be developed by research in the next few years.

The Youngest Board of Supervisors?

By RICHARD S. KEEP

THE Lorain Soil Conservation District in Ohio has a young and enthusiastic board of supervisors.

In fact, until told differently, they are considering themselves the youngest group of district supervisors in the Nation. Their average age is just under 31 years.

The board is composed of: Gordon Hales, age 30, chairman; James Rollin, age 29, vice chairman; Larry Baumann, age 29, secretary; Corwin Burrer, age 30, treasurer; and "the old

gentleman", Kenneth Brill, age 36.

All the members except Larry Baumann have served for two or more years. Jim Rollin succeeded his father, Glen, who had served 6 years as a supervisor. Corwin Burrer is presently serving as an area director of the Ohio Federation of Soil Conservation Districts.

These men have drawn up, and are carrying out, an ambitious plan of soil and water conservation in this district, near Lake Erie, where dairy cattle, vegetable and fruit growing, and industry predominate.

Note:—The author is work unit conservationist, Soil Conservation Service, Elyria, Ohio.



The Lorain Soil Conservation District board of supervisors (seated, left to right) Corwin Burrer, Gordon Hales, and James Rollin, (standing, left to right) Larry Bauman and Kenneth Brill.

Cattle and Mink

A Minnesota Farmer Traps Mink on 25 Neighboring Farms to Supplement the Income From His Cattle Farm.

By A. B. FOSTER

WAYNE HAWKINSON of Pope County probably farms more land than any other man in Minnesota. During the spring and summer he works his own 265 acres growing hay and grain for a 35-cow beef herd. In the fall and early winter he harvests the mink crop on 25 additional farms that total 6,250 acres.

In switching from riding his tractor in the summer to walking his traplines in winter, Wayne qualifies as a really diversified farmer. And he proves the point made by wildlife specialists—that game is actually a crop of the land to be harvested, yet managed and conserved to produce another crop next year and the next.

Just which side of Wayne's business shows

up the best on his income tax return only Wayne can tell. But it doesn't take an auditor to measure the satisfaction he gets from his kind of farming.

Wayne's interest in wildlife is not limited to trapping mink on the streams and marshes of his own and his neighbors' farmlands. Right now he is developing a wildlife area on his own land.

Hawkinson already had a 40-acre lake that averaged 4 feet deep on his farm. Right next to this lake was an abandoned 80 acres that had gone back to the county for taxes. This 80 was flat and grown over with weeds.

"It was too wet for grass and cows and too dry for ducks and muskrats," Wayne said. He had his eye on this abandoned 80 for some time

Note:—The author is information specialist, Soil Conservation Service, Milwaukee, Wis.



Hawkinson inspecting mink traps on a neighboring farm.

with the idea that he could flood it by raising the water level in his own lake, since a small stream flows through the neighboring 80 into his lake. Soil Conservation Service engineers made surveys that showed a dam could be built about a half mile below his present lake that would raise its water level 2 feet and flood a large part of the flat 80.

Wayne bought the 80 acres for \$400 last year. Before he could proceed with the earth dam he had to present his plans to the State conservation department, since he was damming up a permanent stream, which was public water. The division of drainage and water approved his plan and he started the project.

The dam and the spillway cost \$1,440. Hawkinson got some cost-sharing payments through the Agricultural Conservation Program, which helped a lot. The dam consists of an earth fill 275 feet long and 14 feet high, with an 18-inch concrete tube through it and an emergency spillway around one end.

The result is that he now has a 97-acre lake where he previously had 43 acres. The total wildlife area is 139 acres, including the reed-covered marsh. This makes an ideal place for muskrats. Wayne doesn't trap the rats but they are good for the mink to feed on.

This dam serves other purposes besides providing more marsh and water for wildlife. With its 212 acre-feet of flood storage it is serving as a flood prevention project on the small stream. And it will help protect the township road below the dam where in the past high water has backed up against the road fill.

Wayne plans to improve the area even more for mink by building dens, planting grass and meadow borders, and controlling the grazing. He expects to get some return on his investment by doing some trapping and by leasing hunting rights for waterfowl. And, naturally, he is getting a lot of satisfaction from completing the project that he has had in mind for such a long time.

Hawkinson's mink trapping is a partnership deal with the farmers on whose land he traps. He gives the farmer a third or a fourth of his catch depending on the convenience of working the area and other factors.

He starts trapping on the first day of the season and keeps busy, making use of the legal trapping hours from 6 a.m. to 6 p.m. every day



Wayne Hawkinson plowing contour strips on his grain and cattle farm.

during the month long season. He drives an average of 100 miles a day and has to walk from 5 to 8 miles to go in to the traps. He checks them every day, if possible, though sometimes the weather makes this pretty hard to do.

Wayne has been a cooperator with the Pope County Soil Conservation District since 1952. In fact, he was the first man in his neighbor group to complete all the work in his farm conservation plan that includes contour stripcropping on nearly all of the 120 acres of cropland; some diversion terraces, grass waterways and a soil building crop rotation.

Wayne bought the farm 15 years ago and farmed it for 10 years but wasn't satisfied with its production. Since laying out strips, he really feels that the land is doing what it should and he likes it better too. The strips are on the approximate contour and are 100 feet wide.

A 35-cow beef herd consumes most of the hay he grows. He keeps the calves over a year and sells them as 2-year-olds. He finishes them off himself on his own grain and doesn't need to buy any feed.

"This isn't the best farm in the country, I know that," Wayne said philosophically, "but it's an interesting one. You can have your straight grain and hay farms, and I'll take one with a lake, some trees and marsh, and the call of the wild duck."

Soil Maps Sell Farmers

Twelve Illinois Farmers Sign Conservation Agreements After Seeing Map Exhibit Tended by Merit Badge-seeking Girl Scouts.

By ROBERT REPKE

SELLING soil and water conservation with the aid of soil maps is proving to be a profitable venture for SCS technicians and district directors in the McHenry Soil Conservation District in Illinois.

McHenry County is one of the few counties in Illinois that is completely mapped, the survey having been recently finished cooperatively by the Soil Conservation Service and the University of Illinois.

Note:—The author is a conservation aid, Soil Conservation Service, Woodstock, Ill.

When Sam Haning, work unit conservationist at Woodstock, was asked to prepare an exhibit booth for the McHenry County Fair, he and the author decided to invite farmers into a booth where they could see soils maps of their own farms. Through newspaper publicity this was advertised widely. One story was headed: "Come in and see your soils map."

But Sam and I were rather busy, particularly at this time of year. So we looked around for help and got the cooperation of a local group of Girl Scouts guided by Mrs. George McNamara. All 14 of the girls were looking for a way to earn their merit badges in conservation. They were required to do something useful in the promotion and establishment of one or more conservation measures to earn the badge.

Since surveying, laying out, and staking conservation practices in the sloughs, fields, and hills seemed somewhat strenuous for 12-year-old girls, it appeared that they would have difficulty making the grade. But, after the district board approved a motion to provide a conserva-



Stewart Wells, farmer-cooperator, points out the location of his farm on county soil map while Sam Haning of SCS and Jocelyn McNamara, Girl Scout, look on.



SCS technicians explain his soil map to farmer, E. P. Brown (center), at a county fair exhibit.

tion booth at the fair, the girls were ready to earn their badges this way.

Then Mrs. McNamara gained approval from the Council of the Girl Scouts of America for the girls to count this service toward credits on their conservation merit badges.

Shortly afterward, she and her charges met with us to get a general idea of the county conservation picture. The girls had already seen conservation practices under construction and had been told about soil types, land capability and the other working tools and terminology used in soil conservation.

So it developed that Mrs. McNamara and her 14 Girls Scouts helped plan the exhibit, decorate and arrange the booth, and take turns being on hand to help answer questions. One SCS man was on hand at all times.

Showing the farmers the soil maps of their own farms proved rewarding. The entire set of field sheets was on hand, and scores of farmers stopped to study them.

Several farmers asked for the address of the office so that they might learn more at a future date. Twelve farmers signed conservation applications for district assistance during the 4 days of the fair.

Farmers' wives also displayed interest in the soils and the information on practical conservation measures. Occasionally, it was the

wife who steered the "old man" over to this exhibit.

Since the Girl Scout merit badge includes conservation of all natural resources, the girls exhibited examples of other things. They had several tanned fur specimens of beaver, mink, muskrat, and weasel. They mounted pictures of song birds. Being good scouts, they had observed the law as they picked wildflowers to decorate the booth. The girls also showed a variety of conservation bulletins, copies of which they made available to interested persons.

Along with one or the other of the conservationists, Mrs. McNamara and rotating teams of the girls were in the booth during all visiting hours. Their presence didn't hurt the attractiveness of the exhibit, either.

QUACKGRASS CONTROL.—University of Wisconsin agronomists have had good success in killing quackgrass with the chemicals, delapon and 2,3,6 TBA. The chemicals were sprayed on the soil early in the season, at least 3 weeks before crops were planted. The control is effective mainly because these chemicals kill the bud growth on the underground stems of quackgrass. Rain is needed after the chemicals are applied to carry them into the root zone of the grass. Too much rain, however, may leach the chemicals so deep into the soil that control will not be effective.

The Virginians



The SCS has had only three State Conservationists in Virginia in the past 23 years. Here they are: Lyman Carrier (center), Sam Bondurant (right), and the present State Conservationist, Frank Edminster.

A COOPERATIVE EFFORT

By BRICE M. LATHAM

COOPERATION—that's what you will find among agricultural agencies and farmers in Anderson County, S. C.

"Proof of the pudding" can be found on the Don and Richard Quattlebaum farm, located just outside of Pendleton, S. C. Here, all agencies have contributed to the setting up of this practical dairy farm enterprise.

Agencies directly contributing to the planning and installation of the soil- and water-conservation practices and the financing and management of the farm are: Soil Conservation Service, Anderson County Soil Conservation

Note:—The author is area conservationist, Soil Conservation Service, Anderson, S. C.

District, Vocational Agriculture department, county Extension agent, Farmers Home Administration, and the Agricultural Stabilization and Conservation Committee. Each had a part they could and did play on the farm.

Here is how Richard feels about it: "Without the help of these agencies, my brother and I couldn't possibly have accomplished the things we did in such a short period of time.

In August 1956, the Quattlebaums bought their 256-acre farm and went into the dairy business. Don says, "It took all our money to buy the farm. We then called on C. J. Marett, Farmers Home Administration supervisor, to help us buy our original herd of cows, dairy and farm equipment.

"In addition, the FHA made us a soil- and water-conservation loan in 1957."

Through the Anderson County Soil Conservation District, a complete soil- and water-conservation plan was developed. J. T. Brannon,



Don Quattlebaum (center) discusses drainage ditch construction with representatives of agencies that are helping him with his farm improvement program. (Left to right) H. D. Marett, county agent; Joe McGee, ASC Committee; C. J. Marett, FHA supervisor; R. M. Jones, Vo-Ag instructor; T. Ed Garrison, SCD supervisor; and J. T. Brannon, SCS technician.

Soil Conservation Service technician, worked with the FHA and the Quattlebaums in planning for the practices and funds needed.

W. M. Jones, Vocational Agriculture teacher at Pendleton, has been a constant advisor. "From the beginning, Mr. Jones has been a great help to us," says Don. "He has advised us in dairy herd improvement, pasture development, and better farming methods."

The County Agent, H. D. Marett, was right in there pitching too. He advised on the management of the crops and dairy herd. Mr. Marett says, "Our latest recommendation is for them to enroll in the 'Weigh-A-Day-A-Month' record keeping program."

The district soil- and water-conservation plan worked out with the aid of SCS technicians, includes practices on which help was needed from all agencies. It includes clearing 40 acres of fertile bottom land and putting in 30 acres of open drainage ditches. Also included was the establishment of 100 acres of permanent pasture, the construction of terraces, the establishing of waterways on the cultivated land, the building of a farm pond, and the designing of an irrigation system.

The ASC helped a lot by cost-sharing in many of the practices. This included assistance in

establishing 40 acres to fescue and clover, fertilizing 32 acres of permanent pasture, installing 2,086 feet of drainage ditches, and the construction of the irrigation pond.

Some steep eroded land has been reconditioned, old bench terraces have been torn down, old fruit trees removed, and sericea planted for hay and grazing on these areas. Alfalfa has been established on 13 acres of good land, and 15 more acres were seeded in the fall of 1958.

Even though time has not permitted the complete plan being established, the Quattlebaums have increased their milk cows from 32 to 50. In addition, they have 40 heifers and calves. They grow all the feed for the herd on the farm.

Besides being progressive and industrious farmers, the Quattlebaums are active in community activities. Both Don and Richard attended Clemson Agricultural College. Don is a member of the Exchange Club and Pendleton Farmers Society, and Chairman of the Three and Twenty Watershed advisory committee. Richard is currently missed on the farm—he is serving his obligation in the Armed Forces.

One of the Quattlebaums' secrets of success, thus far, is their ability to recognize when they need help and to call upon those in the various agencies to get the assistance needed.

A Wildlife Haven

South Dakota Farmers Create a Wildlife Haven by Using Soil- and Water-Conservation Practices.

By LLOYD P. DUERRE

THE proof that abundant wildlife will result from soil- and water-conservation practices on the land can be found on the Martin and Kenneth Nielson farm, 5 miles southeast of Woonsocket, S. Dak.

Martin Nielson started farming here in 1919 on 240 acres. Now he and his son, Kenneth, own and operate 1,200 acres. Their farm is located in an area of light, sandy soils, where wind erosion always has been a problem and reached serious proportions during the 1930's.

Martin became a cooperator with the Silver Creek (now Sanborn County) Soil Conservation District soon after it was organized in 1939. Previously he had been active in the Silver Creek Voluntary Soil Conservation Association, an organization of farmers who got together in 1934 to combat the wind erosion problem.

He has developed and carried out a complete soil- and water-conservation plan on all his land with the assistance of the soil conservation district and Soil Conservation Service technicians.

Martin says, "Wind erosion always has been

Note:—The author is work unit conservationist, Soil Conservation Service, Woonsocket, S. Dak.



Wildlife planting of trees and shrubs bordering a pasture on the Nielson farm.

and always will be our biggest conservation problem. We have prevented our land from suffering any real serious damage recently, but all of us here had trouble during the 1930's." The Nielsons have acquired much of their land since that time and some of it had suffered damage.

Martin says, "Our biggest problem being wind erosion, we started our conservation program by planting trees and grass. Now we have more than 50 acres of field and farmstead windbreaks. Our first 7-acre field shelterbelt was planted in 1936 in cooperation with the Prairie States Forestry Project. At that same time we planted a farmstead windbreak on the home place. Then in 1940 we planted a 10-acre belt on the land where Kenneth now lives and planted 2 acres to protect the Cuthbert school and church. In 1955, we planted 7 acres of wildlife cover in cooperation with the South Dakota Department of Game, Fish, and Parks.

"We plant some trees nearly every year and plan to plant at least one more field shelterbelt in the near future. You can't place a value on trees, it is just in the nature of things to have them. The 1930's proved that we need them to control wind erosion. In addition to their value in controlling wind erosion we wouldn't feel at home without trees.

"Another good thing about having lots of trees is the benefit that they provide for all kinds of wildlife. We have more birds of all kinds around now than when I first came here. In addition to providing homes for songbirds, trees make good pheasant cover and a place for deer and rabbits."

Martin and Kenneth hunt and fish as their main recreation, so having plenty of wildlife around is one of their objectives in planting trees and other wildlife cover. In addition to planting trees, they have developed two other wildlife areas. These are dugouts in sloughs conveniently located near the tree plantings. One of these dugouts was developed exclusively as a permanent waterhole for wildlife. It is located near 10 acres of old trees with a wildlife cover planting 120 rods south of the dugout. The area around the dugout has been seeded to brome, alfalfa, and sweetclover, which is not mowed or grazed.

Martin says, "Now the pheasants, ducks, deer, birds, and all other kinds of wildlife have a permanent waterhole even in dry seasons. With plenty of cover and feed close by, hunting is really good in and around this area. I plan to put another dugout in the same area to hold some more water and make it even better."

The Nielsons put in one of the first stock water dugouts in the district in 1949 and this was enlarged in 1950. Although this area is in pasture, grazing is well-managed so a good cover remains. In addition, Russian olive, cottonwood, and willow trees have been planted. These have done very well and are providing good cover.

The third dugout was constructed in 1955 in a slough area in former cropland that was seeded back to permanent grass. It is surrounded by willow thickets and cottonwood trees. Grazing is controlled to leave a good grass cover. These dugouts also serve as stock watering places.

The Nielsons now cultivate only one-half of their 1,200 acres, using tame grass and legumes in a planned conservation crop rotation on it. They plan to seed more cropland to permanent grass and concentrate on raising livestock.

The cultivated land, in addition to having a good rotation, is protected by splitting the fields into strips, keeping a crop residue cover on the fields, rough tillage, and no fall plowing. These practices have done an effective job of controlling wind erosion.

Martin and Kenneth completed their conservation story by stating, "Our farm is well-balanced and is getting so we can handle it without fear of wind erosion. You have to learn how to handle this light, sandy land and, of course, our shelterbelts are now up to where they really cut down the wind. Raising livestock has been the answer to farming in this area for us, because when this land is in grass, it can't blow.

"We have plenty of good pasture and hay to take care of all the livestock we can handle. Crop yields are up to what they were when this land was first farmed. In some cases, yields are even better due to good soil fertility and better varieties of corn and small grain."

THE SMALL WATERSHED PROGRAM is a great step forward in our national efforts to conserve our soil, water, range, timber, and wildlife resources. This is because the small watershed approach recognizes that soil management and water management are inseparable.

EZRA TAFT BENSON,
Secretary of Agriculture

A DIFFERENT SANTA CLAUS

*A Soil Scientist's Hobby Is Telling
the Real Meaning of Christmas in
The Guise of Santa Claus.*

By ROBERT L. WILLISIE
and RUTH A. FRIES

A hobby — a desire — a Santa Claus suit: These have been used by Robert Finley, SCS soil scientist, of Jamestown, N. Y., to tell thousands of children, for the past 25 Christmas seasons, the real meaning of the day. He takes annual leave from his Government job to play Santa.

He sets up shop in a commercial department store in Jamestown to tell the real, non-commercial story every Christmas. This has attracted some skeptical parents and ministers to find out if what they have heard about this unusual Santa is true. They come, learn, are convinced, and come back for more the next year.

Note:—The authors are work unit conservationist, Soil Conservation Service, Jamestown, N. Y., and assistant to the editor, SOIL CONSERVATION Magazine, Washington, D.C.



Robert Finley donning his working clothes for the Christmas season.

Those most important non-skeptics—the children—seem pleased with this “different” Santa, even though they are not patted on the head, are not told that they will get all the presents they ask for, nor that if they’re good ’til Christmas, those asked-for presents are a sure thing.

Instead, they are first asked if they know the real meaning of Christmas, whose birthday it is they are celebrating, and why presents are exchanged. If these questions stump them, they are told the Christmas story. Now, more than 90 percent of the children know the story, much to Santa’s satisfaction.

Bob Finley is visited by 8,000 to 10,000 children during the Christmas season. Some families travel as far as 150 miles to see him, and they are willing to wait hours in line so that their children may share in this rich experience.



Santa tells the Christmas story to one of his customers.

Mr. Finley’s regular job, outside the Christmas season, is to make soil surveys of three New York counties. Currently he is working on the soil survey in Chautauqua County, N. Y.

He is a man of many talents, most important, he feels, being his ability to get along with children. He said he loves to talk with them and find out what they are thinking.

Finley did not start his Santa Claus career in Jamestown. Previously, he played the role

in Safford, Ariz., Ramey, W. Va., Vincennes, Ind., and Little Valley, N. Y. At all these places he was enthusiastically received, especially by those whom he thinks count most—the children.

DISTRICT PROFILE

OSCAR AND
BERNICE CAMP
of
WASHINGTON

FORTY-FIVE years ago Bernice Bowers, fresh out of Ellensburg Washington Normal School, married Oscar Camp, a farm boy she met at church in Walla Walla, Wash. Together they rented a place of their own and started farming in 1913 near Walla Walla.

Oscar soon recognized that if he was going to continue in business and raise his family as he had planned, it would be necessary to control erosion and conserve the water that ran off his land. Many farmers then followed the practice of burning the stubble each spring before plowing. This may have simplified the plowing operations, but Oscar was convinced that it added to the erosion problem. He soon learned that by disking his stubble and discarding his moldboard plow he could conserve moisture and produce a better crop. He also learned early that land seeded to crested wheatgrass paid dividends in the long run.

In 1929, Oscar and Bernice purchased a 2,000-acre farm near La Crosse, in Whitman County, Wash. Things were not as rosy as they might have been for a few years thereafter. In 1932, as we all know, the bottom dropped out of the wheat price. During this period, Oscar started farming with a tractor, and because of financial conditions and shortage of help, he was forced to do much of his plowing at night.

Oscar bought a gentle cow with the thought that perhaps Mrs. Camp would be able to help him with the chores. But he soon learned it was useless to try to teach a city girl to milk. Then the cow contracted milk fever and died. After that, Oscar decided it would be cheaper for him to take care of the cows. However, Mrs. Camp learned about poultry and took full charge of a flock and also the garden.

Oscar recalls one of the most trying periods of their married life was after their house burned down in 1919. For the next 6 months, after the fire, they lived in a tent. Mrs. Camp recalls that she had to hold an umbrella over the baby to keep the rain from dripping through the canvas onto his crib, and that she had her feet frostbitten because of the below zero weather. Several neighbors suggested that she "go home to mother", but she remained with Oscar. Finally, on December 2, with the weather 11 degrees below zero, they moved into their new home.

Mr. and Mrs. Camp have done such a good job of teaching conservation farming to their children that one of their sons was named "Mr. Conservation Farmer of the Soil Conservation Districts" by the Washington Junior Chamber of Commerce in 1957.

Conservation farming has become second nature to Oscar. When the soil conservation district was organized in 1947, he assumed that every farmer in the area would ask for technical help. He knew every farm in the district needed a well-planned conservation program. To his surprise, however, very few farmers took advantage of the technical help and facilities offered. Yet, his enthusiasm for the self-government idea remained undiminished and his impatience was directed only toward those he felt

were "dragging their feet" and serving as "wet blankets" to the district concepts and ideas.

Oscar became a supervisor of the West Whitman Soil Conservation District in 1948 to serve the unexpired term of an elected supervisor who moved away. It was at that time that Oscar and Bernice really caught the conservation fever, from which they have not yet recovered. They started attending soil conservation district association meetings in 1949 and have not missed a State convention since that time. In addition, they have gone to every Pacific area convention since 1951 and every national convention since 1952, as well as countless other out-of-State conservation meetings.

Oscar resigned as president of his area association in 1952 to become vice president of the Washington State Association of Soil Conservation Districts, serving as its president from 1954-56. A certificate of tenure was awarded him in 1954 for his conservation activities by the Washington State Soil Conservation Committee. He has served 3 years as a member of the Washington State College of Agronomy Advisory Board, is a member of the Washington State Soil Conservation Committee, has served several years on a committee to advise the State Agricultural Stabilization Committee on ACP matters, as well as being a member of the Columbia Interstate Compact Commission in 1954. He also belongs to several civic organizations in and around Spokane.

In the meantime, Mrs. Camp has not just been tagging along. She accompanies her husband to many of the meetings and takes an active part in those she attends. She has served 4 years as secretary of the State Association Auxiliary, as well as being vice president of the ladies auxiliary of the National Association of Soil Conservation Districts for 3 years.

In 1957, in recognition of their devoted service to conservation, the Washington State Association awarded to Mr. and Mrs. Camp its Special Service Award. Ordinarily this award goes to one person, but because the award was earned by a genuine "spirit of togetherness", the 1957 award was given to both Mr. and Mrs. Camp for their outstanding work in conservation.

The Camps feel that the glory in a soil- and water-conservation program is great, and there is plenty to go around, but it is up to each dis-



Oscar and Bernice Camp receive the special service award from the State of Washington, 1957.

trict supervisor to get the job done. He says, "We are the boys who must direct the program in our districts to see that farmers stop losing their topsoil through wind and water erosion."

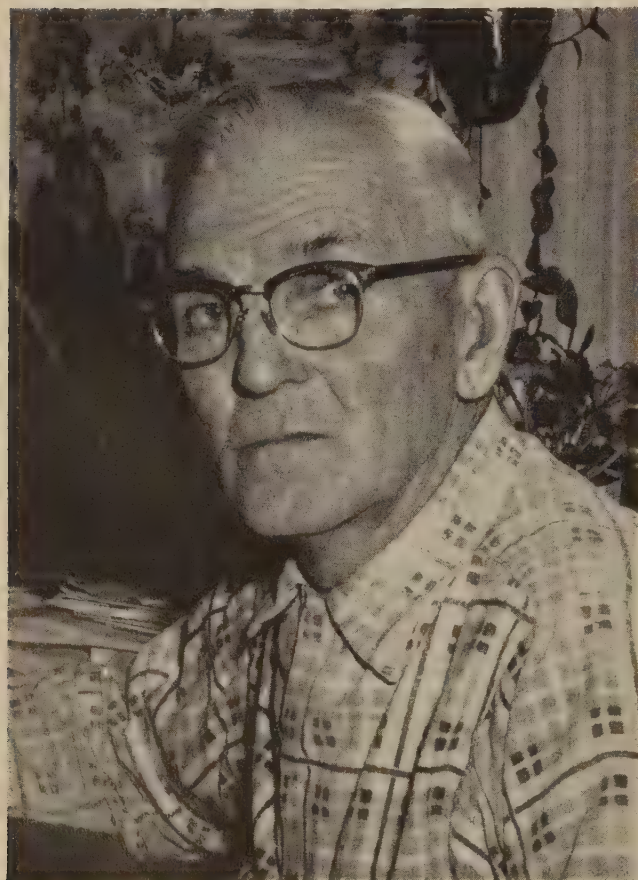
—H. C. FLETCHER

DISTRICT PROFILE

FRED H. TOTTEN
of
NEW JERSEY

FRED TOTTEN farms 144 acres, near Ringoes, in New Jersey's Hunterdon County, growing corn, oats, wheat, and hay to feed his dairy herd of 45 Holsteins and a flock of 900 White Leghorn layers. Every Saturday morning, for years, he has supplied a fresh-egg route in Trenton, 22 miles away. Thus, just about everyone in the area knows Fred.

He is the "Pappy" of the soil conservation movement in New Jersey. Fred's farm has



Fred H. Totten

slopes as steep as 25 percent. Soil and water losses used to be heavy. When the Neshanic River Watershed project was set up in 1935, Fred was the first to apply for assistance. Almost overnight, his farm became an outstanding example of modern conservation practices. His was the first modern terrace system ever installed in New Jersey. From the beginning, he preached and practiced conservation farming.

In 1942, the landowners of Hunterdon County voted to form a soil conservation district and Fred was chosen supervisor. Five years later, Hunterdon County combined with Somerset and Union Counties to form the Mid-Jersey Soil Conservation District. Fred remained a supervisor and was named district chairman. He has held that office continuously to this day.

He also helped organize the Ringoes Grange, and the National Farm Loan Association of which he has been president for over 30 years. He has been a member of the East Amwell Township school board for over a decade. He has been a member of the executive committee of the Hunterdon County Board of Agriculture for 28 years. He is an Elder of the Presbyterian Church of Larisons Corners. He has served in the Dairyman's League for over 30 years.

"In all community activities," Fred says, "I've found there's inevitably an active role for soil and water conservation."

—HOWARD MASON

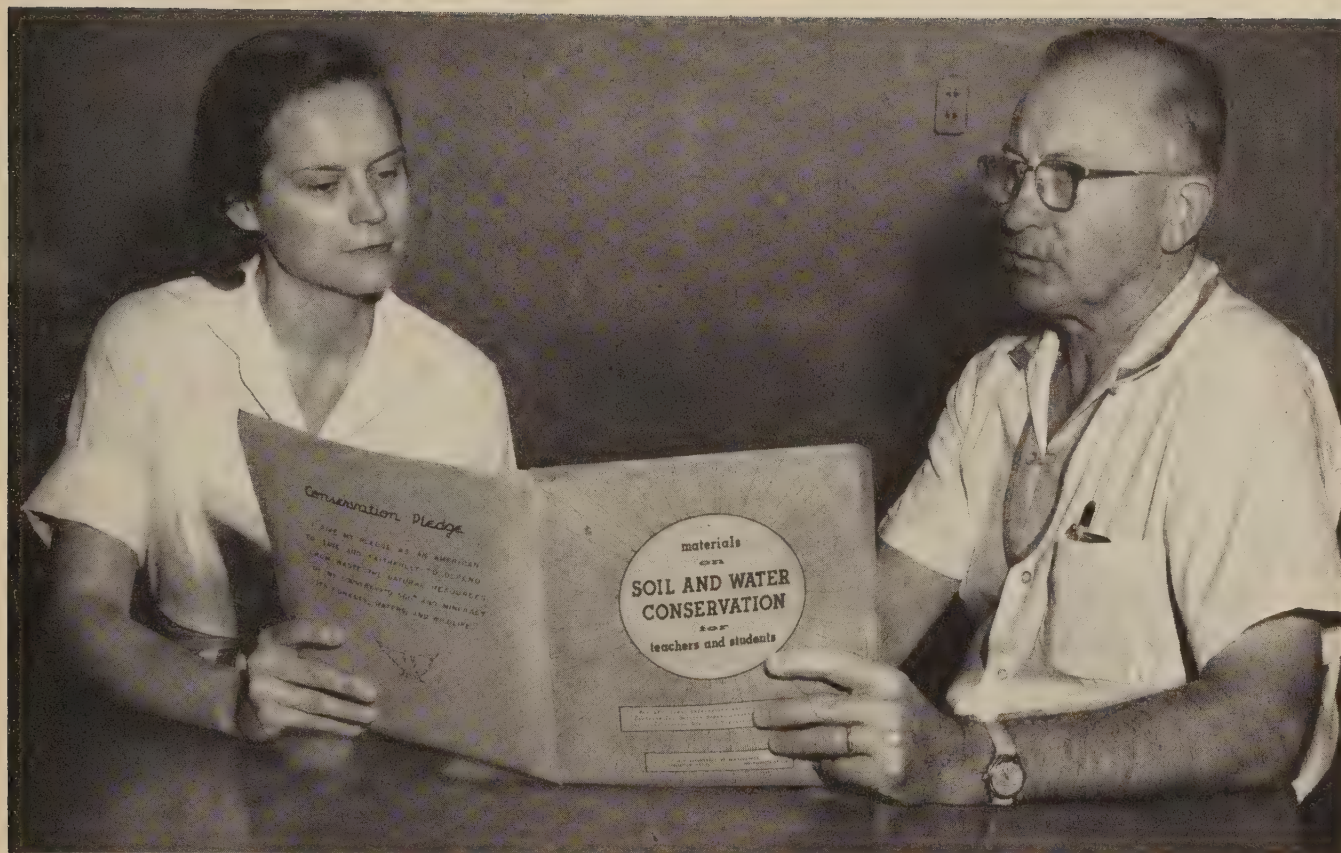
Every Teacher a Conservationist

The Director of the Conservation Workshop at the University of South Carolina Tries to Make a Conservation Missionary of Every Teacher Who Attends.

By J. B. EARLE

FOR the past 6 years the University of South Carolina has conducted an annual conservation workshop for teachers. Numerous agencies have contributed speakers and materials.

Note:—The author is assistant State conservationist, Soil Conservation Service, Columbia, S. C.



G. R. Graham (right) and Mrs. Verna Bozardt, teacher, look at a packet of reference material used in the conservation workshop at the University of South Carolina.

Teachers participating have written excellent term papers explaining the ways in which they plan to incorporate the conservation idea into their regular classes.

G. R. Graham of the university faculty is in charge of the workshop each year. He stresses two reasons for teaching conservation of our natural resources. The first is the "explosive" increase in human population. The second is the changes in cultural patterns resulting from industrialization.

"How to produce, build, and grow without destroying the basis of future existence seems to be at the heart of the meaning of conservation today," he said. He points out that we should not only be concerned with survival but with a more abundant life. "Unwise use by all will lessen man's chances for survival and promptly reduce his opportunities for the good life on earth. Attitudes toward nature—flowers, birds, insects, plants, soil, water, the beauty of them, the relationships between them, our dependence upon them—attitudes that develop early in life and are modified year by year—

these attitudes can save us or they can destroy us," he stated.

This is the challenge Mr. Graham gives the teachers attending these workshops. "An enlightened citizenry is doubtless more necessary now than at any time in the past. The frontier called for hardiness but it supplied all comers with plenty—just for the taking. We can no longer just take; we must plan and provide not only for ourselves but for future generations."

Teachers go away from these workshops agreed that conservation should not be taught as a separate subject. It should be integrated with all of the usual subjects. It should be taught by every teacher, in every grade, and in every subject from first grade through high school.

"Perhaps we might say that conservation is a way of life or a philosophy of life that should flavor all our school work," Mr Graham said.

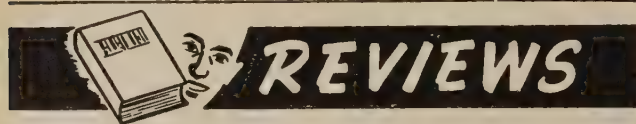
All of this argues for more teaching of conservation of natural resources in both our rural and our urban schools. These schools not only have a responsibility to the individual child but

CHANGE OF ADDRESS SHOULD INCLUDE OLD ADDRESS AND CODE NUMBER.

to society as well.

Perhaps the most valuable information gained in the conservation workshops is the acquaintance that teachers make with soil conservation district supervisors, farmers cooperating with soil conservation districts, and resource people in their communities. They meet the representatives of agricultural agencies and learn the part each plays in resource conservation.

The goal of these workshops is: "Every teacher a conservationist." Through the child the teacher may contact not only parents but many other individuals in the community. Most of these teachers become missionaries for conservation in their communities.



LAND: The Yearbook of Agriculture. 605 pp. Illustrated. 1958. Washington, D. C.: U. S. Government Printing Office. \$2.25.

THE new 1958 yearbook of agriculture is a fitting companion to last year's volume, **SOIL**. By considering land from the standpoint of economics, it leads us to think of problems and policies in the use of the physical resources described in the 1957 Yearbook.

The sections titled "Our Heritage of Land", "How We Use and Manage Public Lands", and "How We Use Our Private Lands" present a history and inventory of our land resources.

"Some Financial Aspects of Land Use" and "Rights, Ownership, and Tenure" cover the economics of land use.

Soil and water conservation, watershed protection, and related subjects are treated in "Taking Care of What We Have."

"Our Woods and Templed Hills" deals with forest land and timber resources.

"These Also Are our Country" describes the land resources and problems of Alaska, Hawaii, and Puerto Rico.

"Our Growing Needs and Problems" and "Planning for Better Use" consider production trends, prospective future needs, advances in technology, and such special problems as transportation and urbanization. Here is significant recognition of soil and water conservation as a part of the improving technology upon which we must depend to meet the soaring needs of our growing population.

The authors, as usual with recent yearbooks, comprise an impressive roll of authorities on the subject. Many of them are from outside the Department of Agriculture.

Two highlights of the book are groups of photographs. One, "Forever the Land" sketches the history of the development of our country, ending on the optimistic notes of education and conservation. The other, "The Face of Our Land Looks to the Sky" shows typical land patterns by means of aerial photographs.

The style and appearance of the book immediately stamp it as a sequel to **SOIL**.

—BEN OSBORN

EVAPORATION LOSS.—The U. S. Geological Survey estimates that 21 million acre-feet of water is lost through evaporation from surface waters of the 17 western States each year.



JANUARY 1959

Soil Conservation

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION.

EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

JANUARY—1959

VOL. XXIV NO. 6



★ THIS MONTH ★

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TOM DALE, Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, June 26, 1958. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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mailed to a single address.

SUPERVISORS' RESPONSIBILITIES.—The supervisors of the Newberry Soil Conservation District, S. C., were hosts to their affiliate members at a supper meeting. Each supervisor discussed a phase of the district's activities. Following the meeting, the editor of the *Newberry Observer* wrote this editorial:

"The average person does not realize the tremendous responsibilities and duties of Newberry County's five Soil Conservation District supervisors.

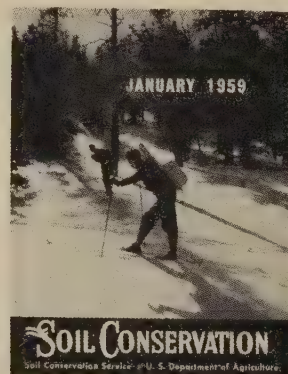
"They perform valuable service to the communities in which they live—a service which is rendered absolutely free.

"Our attention was directed to these responsibilities during a recent banquet given by the soil conservation district in honor of affiliate memberships.

"It is through these affiliate memberships, local businessmen who themselves are conscious of the growing need for conservation, that the district supervisors are able to carry out their duties. Money collected through these memberships is used to buy various supplies essential to their work.

"The saga of these unsung supervisors began 20 years ago, when the South Carolina general assembly enacted into law the Soil Conservation District Act."

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—Volunteer snow surveyors on their way to measure snow pack on a snow course in Nevada.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

A Visit to the Soviet Union

By CHARLES E. KELLOGG

OUR Mission to study soil and water use in the Soviet Union traveled from the United States to Moscow by air, via London, Brussels, and Copenhagen. We returned from Moscow, via Copenhagen and London. Aside from the travel time to and from Moscow, we spent 33 days in the Soviet Union, from July 18 to August 20, 1958. We traveled several thousand miles over the Soviet Union in Soviet airplanes. Numerous side trips and field trips were made by auto. One member of our party, Mr. Bulik, spoke Russian fluently; in addition, we had reliable Soviet interpreters with us at all times.

Except for visits near Minsk, in White Russia, to see research on drainage and field methods for the reclamation of organic soils, the field studies of the Mission were made in relatively treeless areas: in the Ukraine; in Russia proper, near Stalingrad, Rostov, and Krasnodar; and in the Soviet "Republics" of Uzbek and Kazakh in west-central Asia.

The people seemed very friendly everywhere we went. The farm people were hard working

and seemed intelligent. Illiteracy is rare. Attendance in the 7-year schools is everywhere compulsory. But not everywhere do the people necessarily learn Russian. There are 82 languages in the Soviet Union and Russian is not required in all the 7-year schools, though people who expect to get ahead in science, art, or politics learn Russian.

The farms are very large, according to American standards. As a result of recent consolidations of collective farms, there are now fewer than 90,000 state and collective farms in the whole Soviet Union. Except for the small private plots of families on these farms, there are essentially no family operated farms. I was told that there are a few family farms in remote areas surrounded by non-arable land. On a trip in 1945 I visited a family operated farm in eastern Siberia, but we saw none on this trip.

Except for some estates and a few communities, modern farming was not undertaken on a wide scale until after the 1920's. Because of the confusions resulting from World War I and the Revolution it was not until the late twenties and early thirties that modern farming practices were instigated. Then World War II wrought terrible devastation to cities and farms alike in most of the area we visited, which was occupied by the German Army.

In the Soviet Union there are large areas of good soil, including much yet to be developed by ordinary clearing and breaking, by drainage, or by irrigation, drainage, and salinity control. Some development of good soil has been delayed by lack of transportation.

Many of the good soils were developed naturally under grass or a combination of grass and forest, on undulating deposits of loess. Much of the agricultural land has a moderate to high climatic risk. Some years are too cool and wet from an extension of the Baltic climate, and some summers are dry from an extension of the Medi-

Recent agreements between the governments of the United States and the Soviet Union, providing for cultural and scientific exchanges, included a Mission on soil and water use from this country to the Soviet Union last summer. Charles E. Kellogg, assistant administrator for Soil Survey of the Soil Conservation Service, was chairman of the Mission. In addition, the Mission included Marlin G. Cline of Cornell University, D. W. Thorne of Utah State College, Joseph J. Bulik of the Foreign Agricultural Service of the U. S. Department of Agriculture, and Louis B. Nelson, W. H. Allaway, and W. W. Donnan of the Agricultural Research Service of the U. S. Department of Agriculture.

This article is a digest of the summary of impressions of the Mission, prepared by Dr. Kellogg soon after his return to the United States. All photographs were taken by Dr. Kellogg.



The central part of the University of Moscow.

terranean climate from the south or of the desert climate from Middle Asia.

Most farms have made big strides toward mechanization and electrification, especially very recently with the transfer of much heavy equipment and responsibility from the machine and tractor stations to the farms. Some collectives are poor and are not electrified and are short on machinery. The big machines, especially crawler tractors and heavy combine harvesters, are symbols of modern progress to many Soviets.

We saw some excellent machines, including those required for accurate placement of fer-

tilizers at seeding time for corn and cotton and for applying supplemental fertilizers later. We saw good machines for making ditches and other works of improvement. Part of these, however, were testing models and not widely produced. Many farms have milking machines and carriers on tracks for silage and other carriers to remove the manure from barns.

Yet other aspects of farming operations are far from modern. On most farms, for example, the manure is pitched by hand into small wagons and hauled to the field by horses. Many of the dairy cattle are fed green-cut fodder, and much of this is cut by hand and hauled to the barn in small animal-drawn carts. At the same time, we saw modern silage harvesters that fed into the trucks that hauled the silage to storage. In places, much hand work with



Laying drainage tile in peat soil near Minsk, back of a ditch digger of modified Dutch design.



Demonstration near Minsk of making third-order drainage ditch in peat soil.

short-handled hoes is done to control weeds in vegetables, cotton, and other row crops.

We were impressed by some of the crop-breeding work, especially by efforts to develop early-maturing varieties of cotton and rice to make high production of these crops possible during short warm seasons.

The manufacture and the use of fertilizers are expanding. New plants are under construction and others are in plans. There is emphasis on phosphorus and nitrogen, in many places on potassium, and in some places on certain of the minor nutrients. Deficiency symptoms were noticeable, although not extreme considering that this was a wet summer. Skill in the use and application of fertilizers is increasing but



Large plow used for first tillage of drained peat soils, near Minsk.

Soviet farm managers have a considerable way to go in this skill to equal, let us say, the Dutch, Belgian, British, and American farmers.

Deficiency of transport is a serious limiting factor to agriculture in the Soviet Union. The country is very large and the rivers are nothing like so helpful as those in western Europe and in central United States. Thus transport is difficult for getting such supplies to the farms as lime, lumber, fertilizers, and machinery. And, of course, it is difficult to transport the farm products promptly to the places where they are required.

For some reason the Soviet Government has not placed a high priority on highway construction. The roads to most farms are ungraded and are either very muddy and rough or very

dusty and rough. This means that most trucking is done by relatively small trucks of 2 to 3 tons. Because of these serious limitations of transport, it is difficult to get building materials for houses in many places. It has resulted in the inefficient production of some crops, such as fruits and vegetables, in places not well suited to them.

The amount of labor on many farms seemed excessive to us. Some chairmen of collective farms agreed they could operate with considerably less labor. But of course this situation cannot change until there are more factory jobs and other economic opportunities for people now on collective farms.

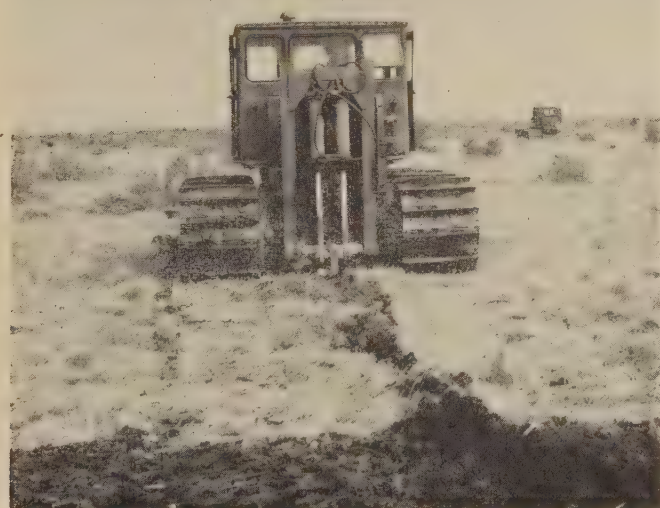
The weed problem is generally serious on



A group of better class homes on a collective farm near Dnepropetrovsk.

most farms that we saw. Perhaps this problem became worse during the confusion of World War II. As a result costs are high for extra tillage and hand labor; and the good structure of some soils is injured by this excess tillage. For high efficiency a large increase in chemical herbicides is needed, especially on the grain crops, including rice. Most Soviet agriculturists are aware of this need.

The collective farms vary widely in income. Those that were examined were, of course, somewhat better than average. Including both payments in cash and payments in kind, a standard work-day unit ranges from around 7 or 8 rubles to 25 or 26 rubles. (Ten rubles equal about 1 dollar.) We have no doubt that some are lower. The problem of these low-income collective farms has led to the concentration of



Mole drainage machine operating in peat soil near Minsk. Hydraulic system at rear controls the grade level.



Harvesting silage on a collective farm near Rostov.

management skills by the consolidations of collective farms. The Communist Party watches the farms and arranges that poor farms select competent chairmen in order to improve the farms.

Living standards vary considerably among farms, depending upon their income. Generally they are lower than the living standards on commercial farms in the United States, but they are much better than those common in the villages of southern Asia. Many of these farms had difficulty in building houses for their people immediately after World War II. On the more productive farms the old houses are gradually being replaced with considerably better ones. A typical new one-family house has a living space of about 60 square meters. It has

a metal roof, good windows, and warm walls. A few even have small refrigerators and other conveniences.

Farm planning based on soil maps is generally good. By our standards these maps lack some in both cartographic and classificational detail. It was explained to us in Rostov that following the soil mapping, and any additional soil testing, farm plans were made cooperatively by the experts on the farms and those in the government. Disagreements and difficult situations were said to be ironed out in conference; and when the plans were finally agreed upon the chairmen of collective farms and managers of state farms were expected to adhere to them.

Because of the widespread knowledge of soil classification among the agriculturists, including the agronomists on farms, and because of the controls inherent in the Soviet system, we saw relatively few instances of soils unsuited to agriculture being used for agriculture. We were impressed in the "new land" area, for example, with the care with which soils subject to serious hazards of drought, erosion, or blowing were avoided for field crops and the care with which they were maintained in vegetation. We saw very little overgrazing of grassland subject to erosion or blowing. Some of the other details of farm planning were carried on with less precision and accuracy than in the United States. Then too, we noted some sig-



Typical dairy herd as milking time approaches on a collective farm near Kiev.

nificant differences between the plans and the actual cropping patterns on the ground.

Generally, soil erosion is less serious in the Soviet Union than in the United States, partly because a higher percentage of the land used for crops is level to undulating, partly because of the pervious nature of the majority of soils, and partly because a smaller part of the rain comes in showers of high intensity. In many places, however, the perennial streams have entrenched themselves deeply into the loessial plains. Natural ravines lead back from the rivers into these plains and along their sides one sees considerable gullying. This was especially noticeable along the lower Volga and Don Rivers. Other examples could be seen along streams in the Ural Mountains and elsewhere.

The Soviets do well with vegetative practices for erosion control, such as tree planting and guarded grass, but they make rather poor use of terraces, diversion terraces with chutes, and other farm structures for gully control. They know how to make such kinds of structures; we saw them along railways and near some cities. Except for large dams, canals, and similar works, civil engineering is far less applied on farms than is mechanical engineering.

We saw a good many shelterbelts and windbreaks, partly to protect crops from hot summer winds and partly to guard against soil blowing. Perhaps some serious hazards of soil blowing exist in the Volga region east of Stalin-



Good wheat ready for harvest on a collective farm near Kiev. Farm manager at left; chief agronomist of the farm at right.

grad and elsewhere that we did not visit. We do not know. But on the whole that problem was not so apparent as we had anticipated from other reports. Of course, this was a wet year, but still the soils did not show much evidence of recent damage from blowing.

The people of the Soviet Union have plenty of room for both vertical expansion on their present farms and for aerial expansion onto good soils. No doubt a great deal more cropland will be made available through drainage and irrigation and a good deal of present cropland will be improved by better practices. Plant-



Stripcropping with protective forest planting on a ravine slope near Poltava in the Ukraine.



Unloading green oats and vetch at dairy barn on collective farm near Minsk.

ing of shelterbelts will help some to protect crops against hot winds. But agricultural planning will need to take account of the climatic risks. Of great general importance will be better and more rapid transport, better storage, and better processing facilities for perishable crops.

Much of their soil and water research is good and interesting. On the whole we did not find it quite so good as we had expected. Currently, as in the United States, many of the most brilliant and promising students are going into physical sciences rather than into the agricultural sciences. We saw many research institutes with good staffs and facilities. The weight of authority and of seniority perhaps holds back

some of the new ideas of the younger men and women scientists more than in the United States.

The soil classification seems a bit out of date to us. It is extremely classifical. From 1870 until World War I the basic aspects of soil classification were more highly developed in the Soviet Union than elsewhere. The system has been accepted in much the same form as it was finally developed by the famous Professor K. D. Glinka in the early 1920's, except for minor changes and qualifications now needed for making detailed maps of farms.

Many of the farms have maps at scales of 1:10,000 to 1:25,000. The plan calls for completion of soil maps on all farms in most "republics" within 3 to 5 years. On the other hand, soil classification is emphasized very strongly in all the teaching of agriculturists in the universities and in the institutes. Thus nearly all of the agronomists, irrigation engineers, and others working on or with farms know the soils well—far better than comparable agricultural specialists in the United States.

The drainage work is proceeding with good machines. The designs are probably based a great deal on examples from Holland and elsewhere. The tile we saw is of rather poor quality, and apparently tile are not yet widely used.

In our view much of the peat land was being somewhat overdrained, as is also true in some parts of the United States. In the irrigated sections we were strongly impressed with the inadequacy of drainage in areas that may become salty. Some of the reclamation projects will certainly require additional drainage for continued success.

We were impressed with the heavy work for irrigation, including the main canals and the canals leading to the farms. But the handling of the water on the farms was not so good as on most commercial farms in the western part of the United States. Our irrigators on farms in the United States waste water; but, it seemed to us that Soviet irrigators were wasting more.

Although we saw many useful field experiments, we failed to see a first-class set of experimental plots laid out in the modern design. The experiments on rice fertilization were conducted on fields of about 15 acres. Experiments with grain crops were often carried out by comparing fields of 100 to 500 acres. Of course



Tractor-mounted fertilizer distributor for side-dressing irrigated cotton on a collective farm near Andizhan, Uzbek.

such experiments have high errors. As a result, the Soviet experts themselves have uncertainties about many practices that we believe could be clarified with systematic replicated and randomized field experiments.

We were impressed by the increasing emphasis on education and scholarship. Generally, students are chosen for the universities and teaching institutes on the basis of competitive examinations. After admittance, students receive stipends so long as their grades are satisfactory. Those getting the highest grades get additional stipends.

Farm people appear to study available pamphlets and books about agriculture. A great many take correspondence courses with the agricultural institutes in order to receive their diplomas as agronomists, animal husbandry experts, and the like. Certainly, the people on the farms want to improve their standard of living and want more rewards for their hard work and enterprise. Also, they seemed to think that these hopes depend on peace.

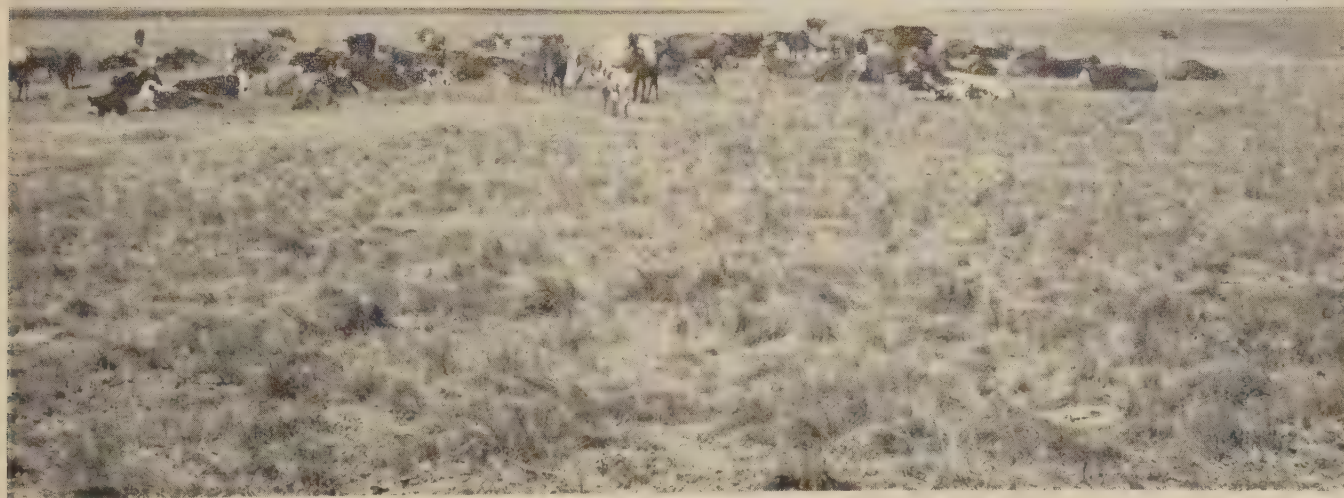
We were impressed by the great agricultural exhibits in Moscow and the one in Kiev. At Moscow there is a large area with many permanent buildings to exhibit all phases of Soviet agriculture throughout the country. Movies and other exhibits set forth explanations of the best practices. Workers on farms who have done well get an opportunity to go with their families to this great exhibit. Certainly, it has great



Freshly plowed virgin dark Chestnut soil to be planted to wheat, on a state farm in "New Lands" area in northern Kazakh.

educational value, especially for rural youth.

Generally, the Soviets have excellent services for abstracting and translating foreign literature. A high percentage of the agricultural scientists who became members of the Academy of the Sciences of the USSR read English and many of them speak it. Without doubt they are considerably more familiar with our scientific literature than we are with theirs.



Red Steppe cattle on virgin range in "New Lands" area near Akmolinsk, Kazakh.



Local soil scientist, G. I. Gruzdev, stands in front of a 4-year old shelterbelt of Acacia, black poplar, ash, and elm on a state farm near Rostov.

At the present time about as many women as men are trained at the institutes in agronomy and animal husbandry. Some of these women do very well as farm agronomists and are promoted to higher positions in the government. Also many women are being trained at the universities in the sciences basic to agriculture. In fact, the soil scientist now in charge of the most important section of the Dokuchaiev Institute—the section on Soil Classification and Mapping—is a highly accomplished woman who speaks excellent English. (This Institute is a constituent part of the Academy of Sciences of the USSR and is the highest authority on soil science in the country.) Should the Soviet Union become involved in a serious war they will have many well-trained women agriculturists.

We were impressed with the obvious advantage of widespread training in soil classification for all agriculturists who are involved significantly in helping farmers plan the most efficient use of their soils on a sustained yield basis.

In some ways recent experience with shelterbelts in the Soviet Union is similar to ours. Originally the idea in both countries was to have wide plantings in which natural regeneration could be expected. In both countries the tendency is now toward much narrower belts

or windbreaks. In the United States we are concerned with both summer and winter winds, whereas the Soviets are primarily concerned with hot summer winds. Their recent experience indicates that shrub rows should be eliminated in field windbreaks and the lowest limbs of trees pruned so that there is about 24 inches of space for the passage of air at ground level.

In large parts of the Soviet Union where rainfall is relatively low and snowfall abundant, special tractor-drawn machines windrow and pack the snow in fields. On many farms this is done 2 or 3 times each winter. On some farms the third operation is done crosswise to the first windrows.

Barring some catastrophe, Soviet farms should increase production substantially, especially in animal products, vegetables, fruits, sugar beets, and other industrial crops. No doubt they could produce considerable grain for export. These increases will depend, however, on increased fertilizer supplies, continued improvement in farm machinery, better and more rapid transport, and more adequate processing of agricultural products, including refrigeration.

I find it impossible to make general comparisons between the agriculture of the Soviet Union and that of the United States or any other country with which I am familiar. The systems are basically different. Some of the agricultural practices seem advanced to an American, some seem inefficient, and some appear doubtful. To the Soviets themselves the most meaningful comparison is between what they had 30 or 40 years ago and what they have now. The improvements are indeed impressive.

STEWARDSHIP OF RESOURCES.—We believe in stewardship of our God-given resources—our soil, water, range, timber, wildlife. Stewardship is vested in both individuals and in groups. Each owner or operator of a farm or ranch has as an obligation to his Creator to use wisely and to protect and improve the land resources that are in his care. Governmental groups have the same stewardship obligations on the public lands they administer for all the people and for generations unborn. We can improve our basic resources. We can rearrange them—can even restore wasted strength and productivity; but we can not create them.

EZRA TAFT BENSON
Secretary of Agriculture

MODERNIZING DRAINAGE METHODS

PLASTIC UNDERDRAINS INSTALLED IN ONE PASS ACROSS THE FIELD MAY SOMEDAY SUPPLEMENT OR REPLACE TILE INSTALLATIONS.

By C. D. BUSCH and T. W. EDMINSTER

WET muddy fields, drowned crops, delays in land fitting, shortened growing seasons, and wet soils are some of the ill effects of poor drainage. Many of these result in losses that can be calculated on a dollar and cents basis. Others such as the time lost with mired equipment and the exasperation at digging it out, can only be estimated.

Farmers with the aid of the Soil Conservation Service and similar organizations, have been meeting the drainage problem as effectively as available methods and finances will allow. Surface ditches, where applicable, provide low initial cost drainage. However, the high maintenance cost and the productive land that is lost to the ditch and its spoil banks make them impractical for many farm fields.

On many soils an alternative is subsurface drainage, of which an estimated 19,000 miles are installed annually in the United States. The total cost of these operations amounts to nearly 15 million dollars. The cost per foot varies with soil conditions, stoniness, labor, etc., from a minimum of around 25 cents to more than \$2. Unfortunately, subsurface drainage has not been modernized, either as to materials used or construction methods. Since the first agricultural drain tile was laid in this country near Geneva, N. Y., in 1835, there has been little change in the materials used. Methods have been improved by mechanical diggers and haulers, but much of the job is still not mechanized.

Let us look at the conventional drainage installation to discover where improvement might be possible. First, the trencher removes about $4\frac{1}{2}$ cubic feet, or about 400 pounds, of earth

for each linear foot of drain, to create a ditch 3 feet deep and wide enough for a man to work in. The conduit may be clay tile, concrete tile, or bituminous fibre pipe—for simplicity it will be referred to as tile. The tile, weighing 6 to 10 pounds, must be lifted into the trench, alined, and partially backfilled by hand to insure a satisfactory installation. Finally, the ditch must be refilled and the soil allowed to settle.

Throughout the installation process, and sometimes even after its completion, normal farming operations in the vicinity of the drain are impossible. When one considers the total



Machine that installs plastic drains at a speed of 1 to $1\frac{1}{2}$ miles per hour.

Note:—The authors are agricultural engineers, soil and water conservation research division, Agricultural Research Service, Ithaca, N. Y. and Beltsville, Md., respectively.

annual national drainage bill, it is obvious that lower labor or materials costs could result in substantial savings. The Agricultural Research Service and Cornell University cooperatively with the Caterpillar Tractor Company and the Bakelite Company started looking into alternatives.

Early attempts to get around high installation costs had developed the mole drain. In mole drainage a channel is forced through the soil by the "torpedo" of the mole plow at a depth of 2 to 3 feet. In some of the heavier soils under the right moisture conditions the resulting drain, costing 2 to 4 cents a foot, has a long enough life to make its use practical. However, in most cases not only the stability but also the depth and grade of such an installation leave much to be desired.

The ARS-Cornell project has developed the principle of stabilizing the mole drain by incorporating a plastic liner. Precut vinyl plastic sheeting fifteen one-thousandths of an inch thick is shaped into a "U" and fed down into a mole channel to form an arched plastic roof. A conventional mole plow opens the channel; the plastic keeps it open. The plastic is expected to add 4½ cents per foot to the cost of mole drains, bringing the total to around 8

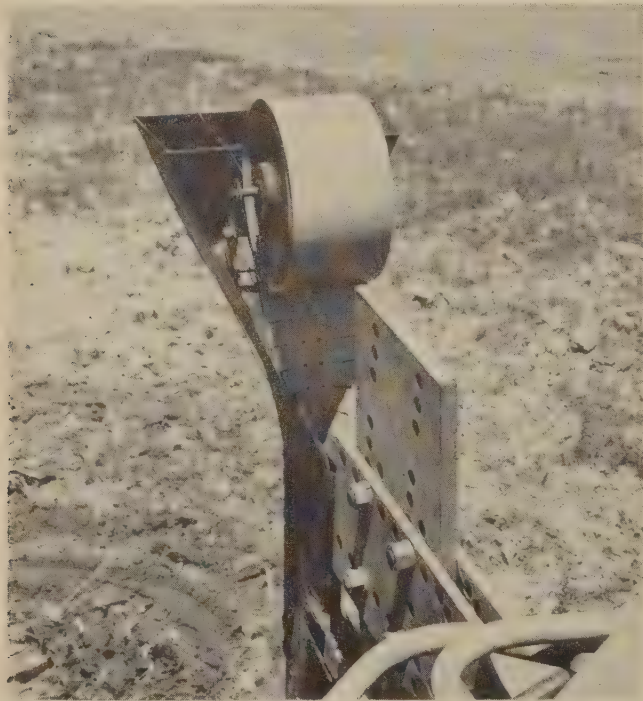


Plastic arch as it appears in the ground after leaving the machine.

cents per foot. Such plastic drains have been installed at speeds of 1 to 1½ miles per hour. There is no need for backfilling since only a 3-inch channel and a 1-inch slit to the surface have been opened.

The testing of this new drain is still in its early stages. However, after almost 2 years of accelerated abuse by over-irrigating, 270 feet of plastic-lined experimental drains are still open, while unlined drains in the same field are already plugged. In addition to the question of their water-carrying life, another concern is the effect of surface loads on this type of drain. Preliminary laboratory studies indicate that the lined drains will hold up under normal equipment loads used on the farm. Unlined mole drains also fail when roots plug the channel and when siltation occurs and erosion causes roof cave-ins. The lining is believed to retard all of these.

As testing on the durability of the U-shaped plastic roof continues, development work is underway on a machine, which will simultaneously install a drain floor. The floor can be thinner, cheaper plastic since it will have no structural job to do. It would serve to retard erosion and sedimentation, and increase channel capacity. The additional cost of installing a floor is expected to be no more than one-half cent per foot.



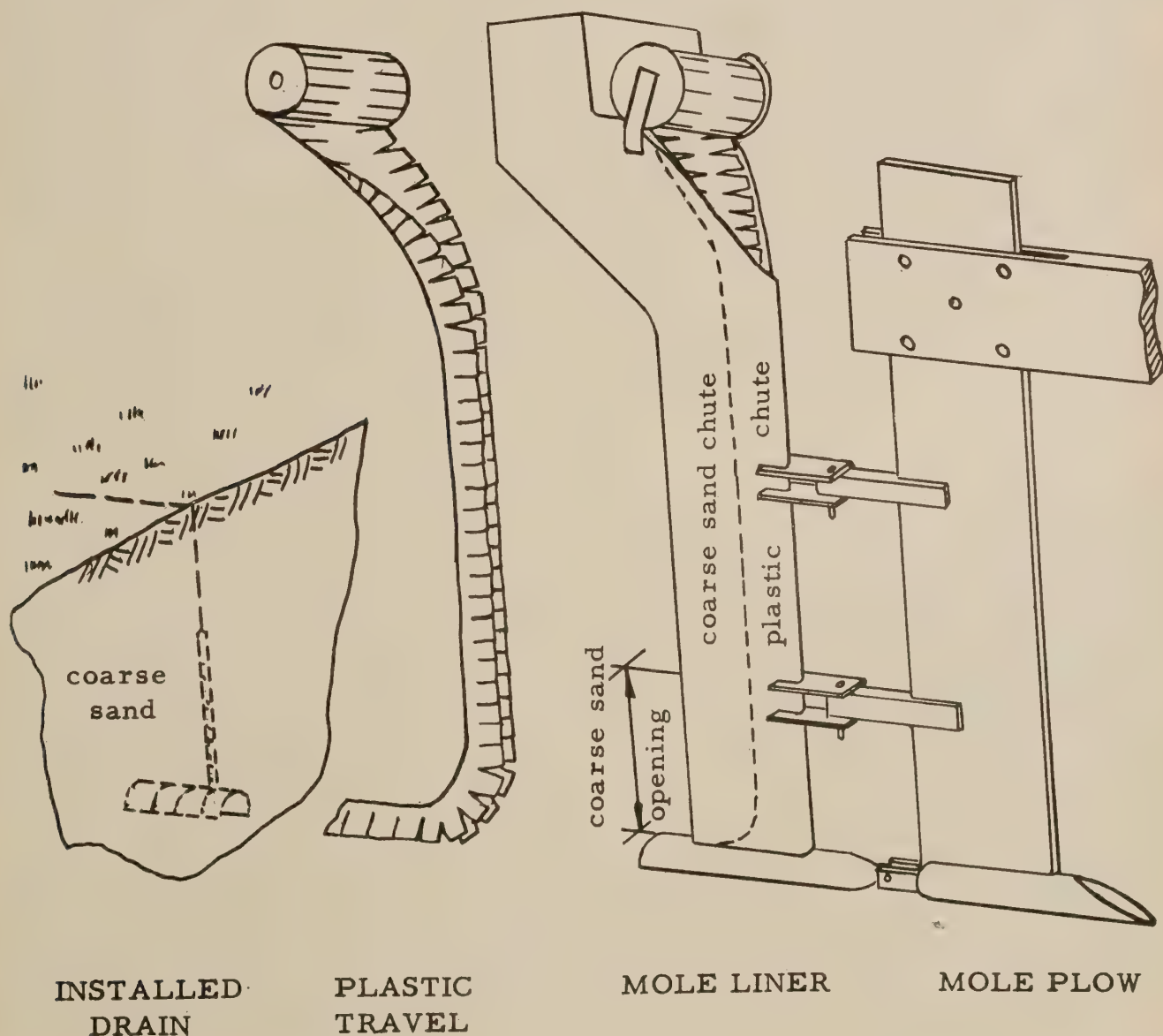
Plastic strip is carried on a spool at the rear of the machine. It leaves the spool flat but is formed into an arch as it travels down the chute.

There may be some bugs—or more literally, rodents—in the technique yet. “Mole” drains might become channels for mice or moles. The drier land over a functioning drain, especially under damp mid-winter conditions, affords the most comfortable location for rodents. To date, however, no rodent damage has been observed on the 6,000 feet of plastic drains undergoing field tests. These drains, installed in varying lengths on three different soil types, have functioned adequately through their first year.

The problem of depth control was mentioned earlier in connection with the unlined mole drains. In the plastic-lined installations the necessary grade has been given the drain by a grade line, and surveyed and staked so that

the machine may operate at a constant depth. The problem of grade control is greatest where it is desirable to maintain the grade by varying the depth at which the drain is installed below ground level. Several systems of automatic depth control are being studied with an eye to such installation methods.

As development progresses, it seems that research may give a drainage technique that will reduce the initial cost of underdrainage by as much as 50 to 75 percent. Perfection of such a drainage technique will permit fast efficient installation of additional laterals to existing tile lines and should aid in the reclamation of some lands where drainage is not now economical.



A Second Look At Flat Top Water

A Co-Author of the Book on Flat Top Ranch Reappraises the Water System of the Ranch After the Long Drought Ended and Heavy Rains Came.

By J. C. DYKES

“THE time to appraise the efficiency of a ranch water system is during the dry years.” These words are from the book *Flat Top Ranch* and were written in July 1956, after 5½ years of drought. The 17,000 acre ranch, owned by Charles Pettit, is in the Lampasas Cut Plain, a subdivision of the Grand Prairie, in Bosque County, near Walnut Spring, Tex.

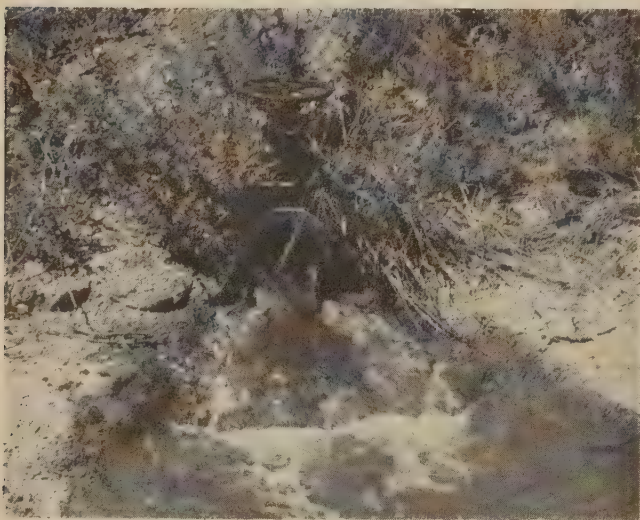
Since the quoted words are mine there will be no quarrel with them here. However, when a ranch water system is subjected to considerably above normal rainfall, it is also wise to take stock. The Flat Top Ranch system got a severe test in 1957, and the rainfall in 1958 was also above average.

Based on an average annual rainfall of 33.69 inches at Fort Worth and the records of the 6 rain gauges on the ranch, which confirm the

usual rainfall pattern in Texas—progressively heavier from west to east—an arbitrary average of 32 inches for Flat Top seems reasonable. During the 5½ years of drouth (1951–56) the rainfall on the ranch was short by an estimated 70 to 80 inches—more than the total expected in 2 years. In only 1 year (1955) did the rainfall exceed 20 inches, and in each of 2 years the total was less than 15 inches. In 1957, total precipitation was 47.5 inches—about 50 percent above average. In 1958, above average rainfall continued until the middle of May, and through September 26 the various gauges showed totals of 24 to 27 inches.

In the 26 months between the 2 visits (July 1956 and September 1958) numerous improvements were made in the ranch water system. The dam which created Big Lake was being constructed at the time of the first visit. Big Lake is the upper impoundment of a series of 5 on the East Bosque, the largest stream in the ranch's natural drainage system. The drainage area above the dam is about 12,000 acres, very little of which is Flat Top land. Big Lake has a surface area of about 100 acres. Ranch Manager W. B. (Bill) Roberts says he was particularly interested in how Big Lake would perform when the heavy rains started in 1957. The lake filled slowly and it was not until April 29, when the rainfall totaled 20.5 inches, that the water reached the spillway. According to Roberts the flow continued through the spillway for about 60 days. The rainfall for May was heavy (8.8 inches) but in June there were only 5 small showers totaling about 1 inch. Seeps and springs in the drainage area about the dam continued to release clear water into the lake long after the major rains were over and were, without much question, partially responsible

Note:—The author is assistant administrator for field services, Soil Conservation Service, Washington, D. C.



The lower end of a draw-down tube through one of the Flat Top ranch water-control dams.

for maintaining the lake at above spillway level for so long.

In addition to the 5 dams on the East Bosque, there are 6 on Rough Creek and 6 on Flag Branch; both streams are tributaries of the East Bosque. These 17 dams perform a unique function on the ranch. They are so located and built that water backs up in the channels along the gentle valleys from one dam to the downstream toe of the dam above it in the series. There is a drawdown tube through each dam and water is released, as needed, to maintain the level of the water in the streams. The water table in the valleys has been restored and over 200 acres of fertile bottom land is now being subirrigated. This is double the 100 acres subirrigated in July 1956.

In July 1956, there were 43 dams of various sizes on the ranch; now the total is over 60. Mr. Pettit refuses to predict the eventual total. There is a new one under construction and, at least, one more in the planning stage, so the end is not in sight. Mr. Pettit is firmly convinced that subirrigation of the native blue-stem grasses pays and says he will continue to construct dams at all suitable sites where he believes the impounded water will improve grass yields. Even the grasses growing along the steep, and oftentime rocky, slopes bordering the subirrigated valleys are benefitting—they were green and growing in late September 1958.



A Flat Top ranch stock water trough.

The heavy rains in the spring of 1957 caused minor to moderate damage to the spillways of a good many water retarding structures in Texas, but the structures did their job well in preventing or reducing flood damage below them. So it was at Flat Top. The spillway on the lowest dam on the East Bosque was partially destroyed, but so well were the 16 dams above it functioning that there was no flooding along the East Bosque after it left the ranch. Bill Roberts stated that while other tributaries of



One of the smaller stock water ponds on Flat Top Ranch.

the Bosque River were out of banks one to several times in 1957, the East Bosque below the ranch never did get over half-bank full before joining the main Bosque.

In the chapter "Flat Top Water at Work," in the book *Flat Top Ranch*, this writer predicted that the neighbors below the ranch would have almost complete flood protection to the point where side tributaries entering the East Bosque below the ranch might cause some flooding in the lower reaches before it joined the main Bosque. But the side tributaries below the ranch drain only small areas, and the control system on the big drainage area above and on the ranch (over 25,000 acres) was so effective that flood damage was completely eliminated along the lower East Bosque in both 1957 and 1958.

One ramp where Rough Creek water was released into the East Bosque was also damaged during the heavy spring rains in 1957. This ramp and the damaged spillway on the lowest dam on the East Bosque have been replaced with rock and concrete structures in line with general ranch policy of making permanent improvements, as needed.

The 1958 visit was made about 60 days later

in the growing season than the 1956 visit. In contrast to the brown curing grass observed on the first visit (July), the ranges and fields were still green and growing in September 1958. There was an abundance of water available for irrigation, and the subirrigated lands were producing as well or better than the irrigated lands.

The increased production of grass resulting from the additional rainfall has led to an increase of about 300 animal units on the ranch. At the low point in stocking in 1956 the ranch was carrying about 1,000 animal units year long. This was a reduction of 60 percent from the high point in 1950 when there were 2,500 animal units on the ranch. Mr. Pettit feels that reductions in the cow-calf operations, such as he made between 1950 and 1956 because of the drouth, are too severe. He plans to solve the problem quite simply—he will never again stock his range as heavily with a breeding herd as he did in 1950.

It was a real pleasure to see the ranch so green so late in the growing season (September). A drive over the ranch flushed numerous coveys of quail, and Mr. Pettit believes the quail population is up sharply. The first ducks



Subirrigated grass for seed, hay, and late season grazing on Flat Top Ranch.



The Flat Top sprinkler irrigation system at work.

of the season were using Flat Top water. The deer and antelope were fat and the wild turkeys numerous. The heavy rainfall had not hurt, and may have improved, the fishing. Perch Lake had water in it for the first time in years. The grass seed harvest was partially over but there was much indiangrass, big bluestem and

little bluestem still to be harvested, and what a sight it makes as it ripples in the fall breezes!

Yes, after 21 months of above average rainfall, it is a pretty good idea to reappraise the efficiency of a ranch water system, particularly when it is the system on Charlie Pettit's Flat Top Ranch.

Modern Hunting— —Old Dominion Style

By GORDON S. SMITH

NO doubt it's happened to you—take off for the annual hunting trip—spend \$50 to \$100 for licenses and expenses—walk the woods and fields for miles—and come home with nothing but excuses.

Most of us have done it—liked it—and will do it again soon as we get a chance. But let's face it. This double time living pace we're doing these days doesn't leave us time to hit the open trails as much as we'd like to, or should.

Time is only part of the problem. Recent figures show that a million more sportsmen took to the fields and streams in 1957 than did in 1956. Over 34 million, all told, applied for licenses. Our exploding population is making good hunting and fishing sites harder and harder to come by. When you find a good place to hunt you often take your life in your hands when you wander into the area. Our superhousing projects, superhighways, and super-shopping centers push the wildlife farther away from us each season.

This is part of our modern living. What can

Note:—The author is information specialist, Soil Conservation Service, Upper Darby, Pa.



Colbert inspects quail breeding boxes.

we do about it? Jim Colbert, in Rustburg, Va., is working on a good answer to the question. With the help of Dr. Frank Maxey, owner of what was a 375-acre abandoned farm, Colbert has started a regulated hunting farm. Colbert and his wife, Elise, opened up for business during the Christmas Holidays of 1957. It took a bit of doing to get going by then. They had launched the project on some raw, eroded fields only 6 months before.

After Colbert had sold Dr. Maxey on the idea, he checked in with the Robert E. Lee Soil Conservation District. Colbert, an expert hunter, also knew enough about farming to know that he needed some expert advice on healing up gullies and tying down the raw land. He needed to know what shrubs, grasses, and crops to plant to give all kinds of wildlife the best possible cover and food.

The soil conservation district supervisors reasoned that this would be good land use. The land would be protected and become more productive as time went by. They approved the farm for technical help.

John Harrison, the local Soil Conservation Service technician, went to work on a conservation farm plan with Colbert. The plan had a reverse pitch from the usual plans that Harrison had worked on. Wildlife is considered a secondary crop on most farms. Here it was to be the main crop. After checking soils and slopes, Colbert and Harrison started figuring what to plant and where; what water-runoff control would be needed in the fields; and, what

kinds of food and cover would best suit the native wildlife. "I want some corn fields, because corn will attract dove. Some good shrubs and grass will bring the deer in during the fall hunting season. I want people who hunt here to be able to get almost anything they're after," Colbert told Harrison.

Hunting license regulations differ between States. In Virginia a hunter from out of state needs a \$3 license to hunt on a game farm. In open country he would need a \$17.50 license. However, if he hunts native game that comes onto the game farm he must have the full license. He must also observe the State game seasons for hunting native game. The pen-raised game season on a game farm is 6 months long—a big advantage to time-pushed sportsmen. It starts on October 1st and extends through March. Colbert has a game farm license to raise wildlife.

The finished farm plan, Colbert's guide for setting up the game farm, included diversion terraces, two farm ponds, stripcropped fields, trees, and enough wildlife food and cover to attract most game birds and animals. Korean lespedeza planted on the contour would make excellent food for bobwhite quail. Shrub lespedezas planted in the guillies would tie down the soil and make good cover for birds. Autumn olive, coralberry, and thornapple shrubs planted



Ringneck pheasants in a pen on the Colbert game farm.

along the wood-edge would provide food and cover for pheasants—especially in the winter snows. Milo, millet, soybeans, cowpeas, and corn planted in contour strips would make good feed for almost any species. Loblolly pine would stop erosion on steep slopes before it could damage the fields below.

The plan looked good to Colbert. Anxious to get the show going, he planted annual Korean lespedeza in several fields. By fall, this made plenty of good food and cover for the quail and pheasant being raised on the farm. Five-hundred loblolly pines planted along a new entrance roadway made a field border and wind-break.

Dog kennels, bird pens, breeding boxes, and, best of all, a handsome rustic hunting lodge took shape. Meanwhile, Colbert concentrated on the first crop of quail, pheasant, and wild turkey. Breeding, feeding, and housing 1,300 quail, a couple hundred pheasants, and a few dozen turkeys was a full time task by itself. This was all new to Colbert. "I got all my advice from the State Game Commission," says Colbert. "Those 72 quail breeding boxes were made according to their design. The pens are built to their specifications, too," he noted.

The healthier quail are paired off in the breeding boxes from April to October. Colbert can get up to 1,600 eggs a month from this production line. He figures it costs him \$1.50 to raise each quail.

Colbert's hunter-customers immediately noticed advantages. For once they *knew* the birds were there. They also found them healthier—with more get up and go. The two factors spelled guaranteed action. For many tyros, it was their first chance to shoot over a dog.

Another thing missed but not mourned was that anticipation of some trigger-happy joker sending a blast of birdshot into one's hide. While there's no limit on birds at this game farm, there is on hunters. If they're experienced they can go in groups of three. If not, only one or two may hunt—with a guide. Only 18 hunters are allowed to range at any given time.

The farm plus almost 400 adjoining acres that Colbert has hunting rights for make up four "hunts." A "hunt" is a trail set up so that it will not interfere with any of the other



Jim Colbert accepts a quail from one of the Lodge's bird dogs in a field of annual Korean lespedeza.

hunt trails on the farm. At the beginning of the day Colbert takes a jeep load of birds to the fields. They are dropped off in pairs along the hunts to be used that day. Few of the birds leave the area. They know the food and cover are good there. If 2 hunters are going on a quail hunt, Colbert will release 25 birds along the hunt. If 3 are going out he'll release 35 birds.

When a party takes off from the lodge a guide goes along to show the way. A good dog is a must, too. You can use your own or one of Colbert's. If you're a regular hunter and own a dog, Colbert will board it there in one of the new deluxe kennels for \$10 a month.

As the party heads across the fields things start to happen. A good shot can bag almost any number of quail. The base price of \$35 per day includes 8 birds. Everything over that costs you \$3.50 each. Pheasant and turkey are slightly higher. If you are a real duffer you still get your quail. Eight cleaned and frozen birds are yours to take home even if you don't shoot them.

At the end of the day funnel-like traps are set out in the fields with feed inside. Most of the birds still at large will end up in the traps and return to the pens for another day.

The abundance of wildlife food attracts an unusual number of song birds to the area. Add

that to the mountain scenery and the surroundings are very pleasant.

Proof of the success of this streamlined hunting is the fact that Colbert is already drawing hunters from the Richmond, Washington, and Philadelphia areas. Also, similar hunting farms are springing up all over the country.

Pointing to the low, flat land below the lodge, Colbert remarked, "Next season I hope to have a pond there. We'll have some good duck hunting then. I'll get John Harrison to design a larger pond on down there, and it will make a good bass fishing lake."

Colbert figures it will take about 3 years to get the place in full swing. "With the technical help the Soil Conservation Service is giving me I'll be able to have all the wildlife we could ever use here. When a hunter comes here he'll be sure to go home with a lot more than excuses."

WATER CONTROL FOR WOODLAND IMPROVEMENT

By ROBLEY N. JOBE

THERE are approximately 4.5 million acres of land in the Coastal and Satilla Soil Conservation Districts of Georgia, which cover 13 counties in the southeastern part of the State. This area is noted mainly for its production of pine trees for pulpwood and timber.

About 1 million acres in these districts are producing slow growing hardwoods of little commercial value. Most of this million acres is waterlogged, and known to the local people as hardwood swamps. Under present swampy conditions it takes from 60 to 90 years for the native hardwood trees to grow large enough for harvest as pulpwood. Then the pulpwood is of inferior quality to that of fast growing pine trees.

Recently, some of the pulpwood companies and individual landowners have found that removal of excess surface water may turn these

"hardwood swamps" into profitable woodlands. The better species of pine trees will grow large enough for pulpwood in 15 to 20 years. This means that landowners can produce 3 or 4 crops of pine trees in the same time it takes to produce one harvestable crop of hardwood. Furthermore, the pine trees sell for about 25 percent more as pulpwood than do the hardwood trees.

Landowners in the two soil conservation districts have constructed more than 200 miles of water control ditches during the past few years. These ditches have benefitted about 50,000 acres.

For example, in 1947 Mr. Alfred W. Jones constructed 3 miles of drainage ditch to remove excess surface water from 1,700 acres of woodland. This project was designed and checked by SCS technicians assigned to work with the Satilla River Soil Conservation District in Glynn County. The ditch was dug with a dragline at a cost of about \$6.87 per acre of land benefitted. The ditch, about 4 feet deep,



Drainage ditch on the Alfred W. Jones farm: (above) the ditch soon after construction, (below) the same ditch 8 years later.



Note:—The author is area conservationist, Soil Conservation Service, Waycross, Ga.



Part of the hardwood swamp on the Jones farm: (left) before drainage of excess surface water, (right) the same location 8 years after drainage.

was designed to remove excess surface water only and not to lower soil profile water. The results were highly satisfactory. Mr. Jones now has a fast growing pine forest, established mainly by natural reseeding from adjacent pine trees, on most of this land. He must wait a few more years before he harvests his first profitable crop of pine pulpwood, but he figures

that his profits on this investment will be many-fold and continue for a long time.

The results obtained on the Jones' farm and other woodland tracts of the area show that the removal of excess surface water from these hardwood swamps is a practical means of converting these swamps to new slash pine sites, either by natural reseeding or by planting.

Thoreau With A Camera

A Naturalist Writes About, Photographs, and Practices Conservation of Wildlife, Soil, Water, and Forests.

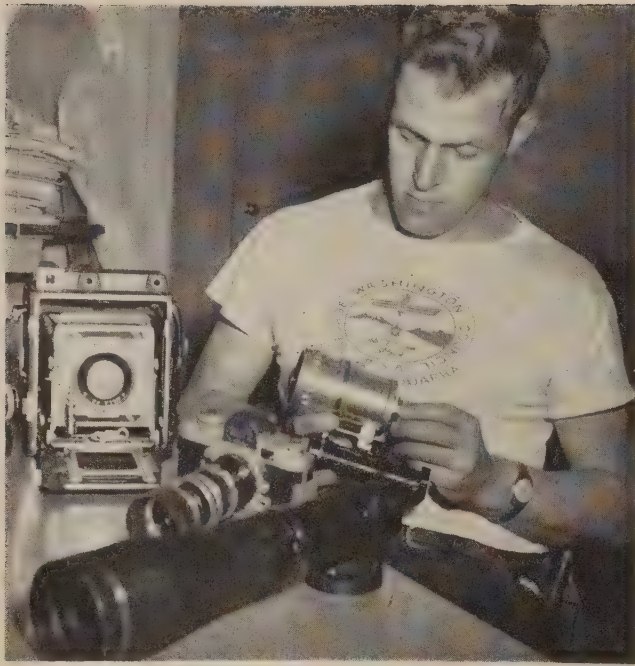
By LESTER FOX

LEONARD LEE RUE III might well be called a Henry David Thoreau with a camera. The two have several things in common. Like Thoreau, Rue is a natural naturalist. He is a close observer and analyst of things around him. He lives much as Thoreau did. He doesn't live in the woods in a hut on Walden Pond. But he does live in the woods, in a cabin on the Delaware River not far from Belvidere, N. J. Like Thoreau, Rue lectures and writes about his observations. Similarly, Rue does not limit his interest to wildlife alone. His interests embrace conservation in its broadest sense.

Note:—The author is an information specialist, Soil Conservation Service, Upper Darby, Pa.

If cameras had been available in Thoreau's day, he undoubtedly would have photographed what he saw. That is what Rue does. He has pictured Nature from Florida to Canada. He has had Nature brought to him at his sylvan retreat from other parts of the country. He plans to extend his travels to widen his range of picturetaking.

Rue's photographs—both color and black and white are used all over the world. He supplies photographs to 70 companies and 400 publications. His preference is for conservation subjects. An example of his work: With a strobe light built especially for him, he took a picture of a flying squirrel from beneath at 1/40,000th



Leonard Lee Rue, III checking some of his camera equipment.

of a second. The squirrel was in graceful flight. An educational magazine published the picture. A popular monthly saw the published photo and phoned Rue for a copy—at a handsome price. A German camera manufacturer bought a print to use in its sales promotion literature. A New York City newspaper ordered a copy. The photo is to be used also in an American Museum of Natural History encyclopedia, two college textbooks, half a dozen State conservation magazines. It has been published in England, France, and Switzerland. Orders are still coming in.

Rue has a roomful of cameras and accessories. He uses different types of cameras that take pictures of various sizes and for different purposes. His accessories include telephoto lenses as long as your arm and automatic shutter trippers. Yet, with all this equipment, one picture had eluded him. He wanted to photograph a rattlesnake at the instant it struck its victim, in this case a ball. But he had no device that could trip the camera shutter fast enough. His shutter was too slow and always pictured the snake on the recoil. So a manufacturer agreed to make Rue a special electric eye that would work fast enough in operating the shutter to get the picture he wanted.

Lennie Rue started taking pictures when as

a boy he was given a box camera. "This might seem funny, when you look at all the high-powered equipment I have now, but I'm still selling a picture I took with that box camera," Rue said. "It's a picture of a bear I took in Tennessee."

Rue came by his interest in conservation naturally. He went to elementary school in Paterson, N. J., where he was born. When he was 11, his family moved to a farm at Manunkachunk, N. J. He spent the rest of his boyhood on the farm. He studied Vocational Agriculture in school. He did not finish high school. By then he had developed a definite leaning toward conservation. He spent much of his time in the woods studying nature.

"When I was 8 years old, I was given my first book on birds," Rue recalls. "That sharpened my interest in nature. I have been making a study of wildlife, natural history, and all the other phases of conservation ever since. When I was 25, I decided that nature photography was my life's work."

When he was 19 (he's 32 now) Rue got started in writing by contributing a column on nature to the *Washington Weekly Star*, published near his home. "The pay wasn't much but the discipline was good for me," Rue says.



A part of the 82-acre farm near the Delaware River that is to be developed as a wildlife refuge by the Washington Council of the Boy Scouts.



Boy Scouts practicing archery at Camp Pahaquarra. (Photo by Leonard Lee Rue, III)

"I had to keep writing to meet the weekly deadlines."

Rue now writes, as well as photographs, for a number of nationally known magazines devoted to various phases of conservation. His first book was *Nature In Motion*, published through the Audubon Society as one in a series of a junior book club. Besides doing the text, Rue contributed 10 color and 19 black and white photographs. His latest interest: A new book titled *Land Animals of North America*.

"Seventy percent of the book will be pictures," he said when he was working on it. "That's because people don't want to be educated—they want to be informed. There's a difference, you know." Rue is an educator though. He teaches woodcraft and nature at a private school in Blairstown, N. J.

Throughout the summer Rue guides groups of Boy Scouts on canoe trips through the woods of Canada. His basic aim is to make the boys aware of conservation and develop their interest in it.

He is a camp ranger of the George Washington Council of the Boy Scouts. He lives with his wife Elizabeth and their three sons at the council's 1,200-acre Camp Pahaquarra on the Delaware River.

Adjoining Camp Pahaquarra is an 82-acre

river bottom farm. It is the historic site of the old Dimmick ferry that had linked New Jersey with Pennsylvania. The land was worn out and rundown from continuous corn cropping. For years Donald K. Wolff, head of the Belvidere Soil Conservation Service office, had been eyeing the farm. He was hopeful that someone would buy it who would put it under a conservation program. That hope was shared by Rue. They both thought that the Boy Scouts were the ones who should buy it. Both had visions of making it into a model farm featuring wildlife and woodland conservation.

Two years ago the Boy Scout Council bought the place. Rue's and Wolff's dream began to take form. The council signed an agreement with the Warren County Soil Conservation District to help apply a coordinated soil conservation program to the land. Rue and Wolff worked together in developing the plan. Their uppermost thought was to use the farm in teaching conservation to the Boy Scouts and in showing others how to work with Nature.

Workers started applying the conservation plan last spring. The plan calls for the installation of 62-foot contour strips of soybeans, New Jersey wildlife food-patch mixture, red and sweet clover, rye, bicolor lespedeza, alfalfa, Kentucky 31 fescue, sericea lespedeza, and

CHANGE OF ADDRESS SHOULD INCLUDE OLD ADDRESS AND CODE NUMBER.

birdsfoot trefoil. Between the strips are rows of wildlife shrubs, including multiflora rose, tartarian honeysuckle, and autumn olive.

The conservation plan also calls for planting Norway spruce, Austrian pine, sawtooth oak from Korea, and Chinese chestnut trees. An-

other important part of the plan is the building of a 6½-acre pond. The lower part of the pond is to be stocked with fish. The upper half will form part of a marsh development.

"This," Rue said, "is to be our conservation show place."



A prize shot of wildlife in the wild made by Leonard Lee Rue, III.



FEBRUARY
1959

SOIL CONSERVATION

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION.

EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

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TOM DALE, Editor

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FISHING RODEO.—About 150 youngsters participate each year in an unusual "rodeo" in Watauga County, N. C. The youngsters spend an entire afternoon trying their luck at fishing in a large farm pond on the Diamond S ranch near Boone.

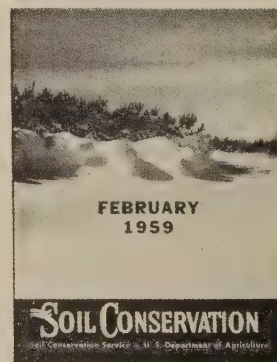
The pond was constructed in 1950 as a part of the conservation program being carried out in cooperation with the Watauga County Soil Conservation District. Bream were placed in the pond in the fall of 1950, and bass added the following spring. Proper fertilization and management brought the fish to pan size by the spring of 1952. That is when Bo W. Stallings, the pond owner, began his fishing rodeo.

No charge is made for fishing in the pond. Any boy or girl, age 2 to 10, is permitted to fish on Rodeo Day. The only other persons allowed to fish in the Diamond S pond are local Boy Scouts and occasional Sunday School groups.

Boone merchants donate gifts for lucky fishermen on Rodeo Day. Prizes are awarded to the youngster who catches the first fish, to the most disappointed fisherman, the one who catches the smallest fish, and to the one who catches the largest fish.

The youngsters who fail to catch a fish do not necessarily have a bad time, as Stallings always treats them to refreshments at the end of the rodeo.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—Snow drifts in the lee of a 12-foot windbreak, Erie County, N. Y.

Photo by G. H. Decker

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Suburban Conservation

A Home Gardener Describes the Soil and Water Conservation Practices Used on His Suburban Lot.

By ARTHUR B. BEAUMONT

MY rectangular lot of $1\frac{2}{3}$ acres lies on sloping land. Before conservation practices were installed, there was considerable water erosion of unprotected soil. Now that the entire area is under a complete conservation plan erosion is negligible and soil productivity is greatly improved.

For a number of years I was engaged in educational and administrative work in the field of soil and water conservation. Gardening was my hobby. I recognized that I had an excellent opportunity to "practice what I preached", to demonstrate practices I advocated for suburban or urban conditions, and to do some experimenting in this field. So into suburban conservation, a fairly new field, I plunged with a beginner's enthusiasm. The experience has been rewarding. My story may be helpful to other conservation-minded suburbanites.

At one time I had six garden plots of various dimensions. Three plots were used for growing vegetables and three for flowers. The total area under cultivation was about 11,500 square feet, (slightly more than $\frac{1}{4}$ acre). Twelve conservation practices have been demonstrated on garden plots and on areas not in gardens. I have proved to my satisfaction that many standard practices commonly used on farms, or modifications of them, can be applied to suburban conditions similar to mine.

On the cultivated plots I have established the following practices: (1) Contour planting, (2) Across-the-slope planting, (3) Terracing, (4) Mulching, (5) Cover cropping, (6) Use of odd-shaped areas, and (7) Drainage.

In addition, outside of the garden plots the following practices have been established: (8) Tree windbreak, (9) Permanent sod cover, (10)

Bank protection by vegetal cover, (11) Slope protection by water spreader, and (12) Conservation of organic matter in compost.

Advance planning of conservation practices is important. Although I was not classed as a conservation planner, I nevertheless did my own planning. With elementary knowledge of conservation principles and with some imagination, the average suburbanite or suburbanite can plan most, if not all, of his conservation practices. Necessary information can be gotten from the abundant literature on the subject available from the Federal Extension Service, the local soil conservation district, or the Soil Conservation Service. In many soil conservation districts expert advice on difficult problems can be obtained from technicians of the Soil Conservation Service.



A. B. Beaumont displays the heavy hay mulch he uses in his sweet corn patch.

Note:—The author is a consultant of the Soil Conservation Service Amherst, Mass. Formerly he was State conservationist, Soil Conservation Service for Massachusetts.

The area that required the most planning was a plot about 128 feet by 66 feet in size. The slope of this plot is from about 8 to 11 percent. I decided to divide the plot into approximately equal areas with a miniature terrace. This simplified the problem by making smaller areas to work with. The terrace, built with a hoe, is about 18 inches wide and 6 inches high. It has a grade of .5 percent, which causes it to discharge water onto permanent sod. Asparagus roots were planted in the channel of the terrace. A terrace is rarely necessary on long, narrow plots if the longer dimension runs across rather than up and down the slope. Such was the case with a contour flower plot 9 by 76 feet.

The parts of the plot on each side of the terrace, except for an odd-shaped (triangular) area, were planted to row crops on the contour where the slope was regular. And where the surface was so irregular that contour planting was not practicable the plot was planted across the slope. These mechanical practices were supplemented with mulches or cover crops, and the combination gave almost perfect conservation. The triangular area was planted to melons.

Mulching the soil with loose organic matter is one of the most effective conservation practices. Mulches not only reduce erosion to a minimum,



Contour flower bed in the Beaumont garden.

they also conserve soil moisture, check weed growth, improve soil tilth, enhance the intake of water by the soil, and increase soil fertility when they decompose. They are particularly good in a garden because they prevent raindrop-splash erosion, which splashes soil onto vegetables.

My principal mulch is hay, which is made from grass cut on the place. It goes onto the garden at the rate of 8 to 10 tons per acre. Two flower plots are mulched with hardwood leaves. Strawberry plants are mulched with pine needles, and small plots have been mulched with sawdust and lawn clippings.

While mulching is one of the best conservation practices, it may be expensive if mulching material has to be purchased.

The use of cover crops is one of the simplest, easiest, and least expensive conservation practices for a garden. Like mulches, cover crops protect the soil from erosion. They also add organic matter to the soil but usually not as much as do mulches. Cover crops may be sown on bare ground for protection at any time in the growing season, but they are usually sown in late summer or early fall for winter protection.

The small grains are most commonly used for cover crops, and of them winter rye is the most popular. I use oats for winter cover because in my latitude the oats make a good fall growth, but are killed by winter temperatures. Since I neither plow nor spade my garden, I prefer something that will not seriously inter-



White pine windbreak 18-years old that Beaumont keeps low by topping.

fere with spring planting and cultivation. I depend on shallow cultivation with a hand-pushed, wheel cultivator.

My contour-planted flower plot is situated in a place where drainage is sometimes a problem. In periods of heavy rainfall and also in the spring when snows are melting, there is considerable surface runoff and seepage. This excess water has been disposed of by digging a trench on the upper edge of the contour plot. With a slight grade to the trench, the water is drained off and discharged onto sod.

On the west and north sides of my property I planted a pine-tree windbreak. This windbreak not only reduces evaporation of soil moisture and protects growing plants from damage by high winds, it also makes the garden a more comfortable place in which to work in early spring and late fall. The trees, mostly white pine, are frequently topped and pruned to keep them from growing too high and cutting off my view of the distant hills.

A steep bank on one side of my property is protected by means of ground cover vines. For this purpose I have used *Pachysandra terminalis* and a strain of *Euonymus radicans* (wintercreeper). These creeping vines require little attention, but of the two the *Pachysandra* requires the least care. There are many good

ground cover plants other than grass that are suitable for soil protection. Some of them, including *Pachysandra*, are suitable for growing under trees, where it is often difficult to grow grass.

An eaves gutter downspout from the house emptied on a fairly steep slope. The soil was being gullied. The situation was corrected by means of a level water spreader placed in the path of the stream. A creosoted wooden strip about 4 by 30 by $\frac{3}{4}$ inches was used as a spreader. A carpenter's level was employed to level the strip, which was inserted longitudinally, edge up, into the soil, the top edge being made flush with the soil surface. The effect of the spreader was to spread the water out in a thin sheet instead of letting it concentrate in a narrow stream. This practice has proved effective. Aluminum or other suitable metal strip might be substituted for the wooden strip.

The conservation of organic matter by composting is a part of the conservation program. Into the compost pit go all sorts of garden waste such as cornstalks, overripe lettuce, spent flowers, lawn clippings, treeleaves, and garbage. A little nitrogenous fertilizer, lime, and wood ashes are added to promote decomposition. The aerobic-anaerobic system is followed, whereby numerous shovelings back and forth



Miniature terrace covered with old asparagus tops with newly laid-out contour rows in the Beaumont vegetable garden.

are not needed. The compost is usually applied as a mulch between rows of vegetables or flowers.

Generally, practices which conserve soil and moisture also increase soil productivity. This is to be expected since the loss of soil and nutrients is reduced to a minimum and soil moisture conditions are made more nearly optimum. The general rule applies in this case. The yield and quality of crops have improved. Here are some examples of yields, all on the acre basis: potatoes (early), 800 bushels; onions, 630 bushels; tomatoes, (ripe) 27 tons, (green) 7 tons; sweet corn, 26,700 ears.

The enlargement of the area of pavement of all sorts and of roofs in suburbs has increased the water runoff, and has, thereby, in many cases accentuated the problem of water control and soil losses. Suburban conservation, if widely practiced, could help solve this problem and would be of particular importance where an entire watershed is being treated. Furthermore, conservation on the home grounds may become a most interesting and rewarding hobby for conservation-minded residents. Conservation, like charity, may well begin at home.



Representatives of some of the agricultural groups of East Woods County that cooperate with the SCD. (Seated, left to right) Cliff Thurman and Charles Lee, SCD supervisors; E. S. Cordell, SCS technician; and Louis Gatz, farmer. (Standing, left to right) Sherman Scott, ASC office manager; Ronald Meek, Vocational Agriculture instructor; Cecil Kirkland, FFA supervisor; Jimmie Gatz, FFA member; and J. B. Kelsey, Vernon McNally, and C. S. Wyman, SCD supervisors.

leadership and the number of people interested in its success.

Because of this type of operation, the world heard about the East Woods County District on November 22, 1957, when Milton E. Bliss of the National Farm and Home Hour released his radio program on the observance of Farm-City Week. Bliss spent the week of November 18-21 in Woods County for the purpose of making these recordings.

Under the leadership of William G. Lamont and sponsored by the local Kiwanis Club, the 1956 observance of Farm-City Week was so successful that Lamont was asked to make the printed program available to the 300 Kiwanis Clubs of the Texas-Oklahoma district. Later at the International Meeting of Kiwanis Clubs, Lamont made a report on the Farm-City Week activity and copies of the program were distributed to 3,000 Kiwanis Clubs.

In recognition of his services in this activity, Lamont was given the Lay-Conservationist Award at the 1958 annual meeting of the Oklahoma Association of Soil and Water Conservation Districts.

The program for the observance of Farm-City Week in Woods County begins with organized tours. Kicked-off by a breakfast at the Northwestern State College cafeteria, around 75 businessmen, divided into 4 groups to cover the district, are taken to approximately 50

Lots Of People At Work

A Soil Conservation District Accomplishes its Objectives by Getting a Lot of People to Work Hard at the Job.

By BERNICE DeSHONG

THE East Woods County Soil Conservation District hasn't built a better mousetrap that the world might beat a path to its door. It has proved, however, that when enough people are interested in putting a thing over the world will hear about it.

This district has operated on the theory that the success of its program depends on informed

Note:—The author is clerk-typist, Soil Conservation Service, Stillwater, Okla

farms. At each stop, the farmer explains some outstanding practice on his farm, and then the farmer joins the group for the remainder of the tour.

On the next day, the farmers are invited into town for a tour of various business enterprises.

On Sunday, the farmers are invited to visit the church of their choice where, in many cases, special services are held.

The Week's observance is climaxed by the Farm-City banquet at which the businessmen act as host to more than 200 farmers. Don Williams, administrator for the Soil Conservation Service, was guest speaker for the banquet in 1957. Jim Devery, local implement dealer, secured Everett Mitchel of the National Broadcasting Company for the 1958 banquet.

The East Woods County SCD is unique in the number of fields in which it has been able to work with other groups and organizations in chalking up outstanding accomplishments.

The idea that "Women Do Things" is being demonstrated in the accomplishments of the East Woods County Ladies Auxiliary. The ladies have furnished conservation kits to 143 classrooms in the schools of the district, and each year have added current material to these kits. They judge approximately 400 posters entered annually in the Soil Conservation



Charles Lee, chairman of SCD supervisors, presents plaque to Bill Williams, president of Alva FFA chapter.

Poster Contest. They provide information kits to ministers in the observance of Soil Stewardship Week. They serve on committees, or in any capacity where their services will be helpful to the supervisors of the district. They have been represented at every annual meeting but one of the National Association of Soil Conservation Districts since the local district was organized in 1948.

The accomplishments of Mrs. Cliff Thurman have brought to the local auxiliary both State and national acclaim. We are unable to say for sure whether Supervisor Thurman made a convert of his wife, or if it was due to Mrs. Thurman's enthusiasm for the cause of soil conservation that sparkplugged her husband originally.

However, the ladies auxiliary can point with pride to this farm-wife of the East Woods district who has heralded her story of soil conservation to every corner of the State, and has spoken at two national conventions of soil conservation districts.

In the 2 years that she served as State president of the ladies auxiliary, Mrs. Thurman made the five area meetings each year. She has also spoken at several Oklahoma annual meetings of SCD's as well as meetings in adjoining States. Mrs. Thurman was both a sec-



Conservation Workshop Committee of Northwestern State College. (left to right) Aurice Huguley of Northwestern State College; Cliff Thurman, SCD supervisor; Hugh Green, chairman of the education committee of the State association of SCDs; Tom Hamilton, educational assistant of the State Soil Conservation Board; Leon J. McDonald, assistant State conservationist of SCS; Leo Brandt, head of the agriculture department of Northwestern State College; Crozier Bush, farmer; Charles Lee, SCD supervisor; E. S. Cordell, work unit conservationist of SCS; and Mrs. Cliff Thurman of the Ladies Auxiliary of SCDs.

ond and a first place State winner in the annual speech contest staged through soil conservation districts. She holds a high goal before the ladies of her own East Woods County Auxiliary.

The four FFA chapters in the East Woods district—Alva, Capron, Dacoma, and Waynoka—participate annually in the FFA-SCD soil conservation contest. In order to get the contest off to a good start, the Vocational Agriculture teachers are invited to attend the supervisors' meeting in August to make plans for the contest.



A group of local bankers who sponsored awards to conservation farmers in the East Woods County district.

The Alva FFA chapter won both the district and area contests in 1956-57 and 1957-58, and placed 5th in the State. Dacoma was 2d in the district in the 1957-58 contest.

FFA members gathered "benefit" statements from farmers and turned them over to the district to be used in news columns. The Capron FFA chapter placed conservation road signs over the district. All chapters participated in the SCD Land and Range Judging School and Contest. And, conservation movies have been shown to thousands of people.

June 2-20, 1958, marked the beginning of a conservation workshop held in connection with the Northwestern State College at Alva. Dr. Jesse W. Martin, president of the college, says "We are happy to have the privilege of co-operating with East Woods County and other soil conservation districts in offering our first annual workshop in soil conservation."

Charles Lee, alumnus of the college and chairman of the board of supervisors, worked closely with Dr. Martin and agency representatives in initiating the workshop. Lee and his fellow supervisors worked with district governing bodies of the 14 soil conservation districts which constitute the area served by the college in providing scholarships for the workshop.

East Woods County SCD is active in the observance of Soil Stewardship Week. The supervisors act as host to ministers at a breakfast or luncheon, followed by a tour to various farms, pointing out the merits of a soil conservation program on the farm.

East Woods County SCD is extremely fortunate in the type of its leadership. Charles Lee, Mrs. Thurman, and William Lamont have been given recognition for outstanding accomplishments.

The district and the local Kiwanis Club co-operates in recognizing the Farmer-of-the-Month. Charles Lee and E. S. Cordell of SCS are co-chairmen of the Agricultural and Soil Conservation Committee that selects the winner.

The Oklahoma Bankers Association, through the local bankers, have made awards to 70 farmers in the district. These awards are presented at annual meetings for which the local bankers furnish the food and the SCD furnishes the program.

The East Woods County SCD points to its report of accomplishments as proof of the merits of its plan of operation. The district is divided into 16 communities with interested, active, and trained leadership. Each community has a job and a goal, but all work together with a common objective.

Twenty-seven thousand acres of former cropland have been reseeded to native grasses, 100,000 acres are being properly grazed, 22,000 acres have brush control, 11,000 acres are contour-farmed. Two-hundred-and-seventy-nine ponds have been constructed, with 120 of them properly stocked with fish, 33 miles of diversions have been built, 430 miles of terraces constructed, 1,943 acres drained, and 152 wells have been dug.

The East Woods County SCD is thoroughly convinced that there is no substitute for working through people—lots of 'em—to accomplish its purpose of soil conservation on the land.

STRIPCROPPING FOR WIND EROSION CONTROL

By W. S. CHEPIL

No. 42

This is the forty-second of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

STRIPCROPPING, wind stripping, or strip farming, as it is variously called in different regions, is used to control wind erosion, especially in crop-fallow sequences in the Northern and Central Great Plains. It is a practice that does not require any change in cropping practices. It merely involves subdividing the farm into alternate strips of erosion-resistant and erosion-susceptible cropping practices. If the cropping practices on the farm are equally resistant or susceptible to wind erosion, there is no need for stripcropping.

Stripcropping is especially adaptable in dry regions where fallowing is done every second or third year. In the northern dry regions the summer-fallowed land is not seeded until the following spring. Thus, it is left bare during the windy season except for what crop residue may remain on the surface from a crop grown almost 2 years previously. To protect it from wind erosion, strips of standing stubble alternating with strips of fallow are virtually imperative on many soils. In the southern dry regions the problem is less acute because wheat on fallow is sown in the fall and if germination and growth conditions are favorable, a good protective cover against next spring's winds is usually obtained.

The purpose of stripcropping for wind erosion control is to provide barriers or trap-strips to check the spread of soil movement if and when it starts. The most common barrier strips are standing wheat or sorghum stubble. The stubble should not be disturbed by tillage or pasturing until the danger of blowing is over. Wheat stubble is generally more effective than sorghum stubble, and standing stubble more effective than flattened stubble for trapping blown soil. The stubble should be left as thick and as tall as possible.

How effective is stripcropping for wind erosion control? The answer to this question hinges largely on how effective the system is in preventing the rate of soil movement from exceeding a certain tolerable limit. Measurements of with different soils and under different wind velocities and directions show that soil blowing is zero at the windward edge of a field or strip and increases with distance downwind until it reaches a maximum. The maximum rate of flow is remarkably uniform for all soils. For a 40-m.p.h. wind velocity, it is equal to about 2 tons per rod width per hour.

The more erodible the soil, the greater is the



A strip rotation of wheat, fallow, and sorghum on a highly erodible sandy soil. Strips are 20 feet wide.

Note:—The author is a soil scientist, soil and water conservation division, Agricultural Research Service, Manhattan, Kans.

rate of increase in soil flow along the direction of wind and the shorter the distance in which the possible maximum soil flow is reached. Soil erodibility and therefore the rate of increase in soil flow are influenced greatly by soil textural class. The intermediate-textured soils, such as loams, are generally least erodible and the rate of increase in soil flow is more gradual than on sandy soils or some clays. Therefore, to be equally effective, strips on sandy soils and on some clays have to be narrower than on intermediate-textured soils. Based on average results, widths of erosion-susceptible strips necessary to keep the rate of soil flow from exceeding .2 ton per rod width per hour should be as follows:

Soil class	Width of strips
Sand	1.2 rods
Loamy sand	1.6 "
Sandy loam	6 "
Loam	15 "
Silt loam	17 "
Clay loam	21 "
Silty clay loam	26 "
Silty clay	9 "
Clay (subject to granulation)	5 "

The above widths are applicable for strips protected by 1-foot high stubble on the wind-

ward side and running at right angles to the wind of a velocity of 40 miles per hour. The widths should be adjusted one way or the other to fit the width of tillage machinery and to divide equally into the whole area to be stripped.

The actual width of strips required is influenced by several major factors. Apart from soil textural class, the general level of wind velocity plays a major part. The higher the likely wind velocity, the narrower the strips should be for equal effectiveness. Also, the effectiveness of the strips decreases as the wind deviates from right angles to the strips.

Still another factor is the width of the barrier strips and the height and thickness of stubble or other plant material in the barrier strips. The primary purpose of the barrier strips is to trap the soil that blows off the erosion-susceptible strips. There is some sheltering afforded by the barrier strips, but measurements have shown that for all but the most erodible soils the distance sheltered by standing stubble is small compared to the distance required for soil flow to reach the maximum rate.

For example, complete protection afforded by 1-foot high wheat stubble extends from 5 to 20 feet along the direction of the wind; but, the distance required for soil flow to reach a maximum rate ranges from about 100 to 10,000 feet, depending on wind velocity and soil erodibility. In other words, the increase in soil flow is not



Contour stripcropping with terraces on a western Kansas field.



Aerial view of the Arneberg dairy farm showing the 5-acre irrigation pond in right middle-distance.

primarily due to reduction in sheltering afforded by the barrier strips. It is due mainly to a phenomenon known as soil avalanching, which is much like snow gathering volume and momentum as it rolls down a mountain.

The barrier strips need to be only wide and receptive enough to trap all the soil, except fine dust, that moves into them. For standing wheat stubble, a 30- to 50-foot width is usually sufficient. However, the erosion-resistant strips are usually rotated each year with erosion-susceptible strips so that both are normally made equal in width. The width of erosion-resistant strips in such cases is usually far greater than that required to trap all soil that may be moved into them.

The width of strips depends, too, on the rate of soil movement that may be considered tolerable. This in turn, depends on how much reduction in erosion is desired. The greater the desired reduction, the narrower the strips should be. The rate of .2 ton per rod width per hour may be considered tolerable. It is not a negligible rate. It is the rate that should occur on the leeward side of strips under a 40-m.p.h. wind velocity without supplementary practices of erosion control. Supplementary practices that maintain crop residues above the surface of the

ground and increase surface roughness and soil cloddiness would normally reduce erosion to a negligible rate. If, in unusually dry years, crops fail and insufficient crop residues, surface roughness, and soil cloddiness are available for needed protection, the maximum rate of erosion in a stripcropping system should be only .2 ton per rod width per hour—about one-tenth of the possible maximum rate of soil erosion.

The tolerable rate of soil flow is associated with the degree of risk the farmer is willing to take. He has to accept the width of strips that would fail occasionally because the width that would reduce erosion to a negligible degree without the presence of sufficient amounts of crop residue, surface roughness, and soil cloddiness would be too narrow to be practical for most soils.

Space is too limited in an article of this type to indicate the intricate relationships between suitable width of strips required for different conditions. Formulas indicating suitable width of strips for virtually any soil class, height of wind barrier in the erosion resistant strips, wind velocity and direction, and tolerable rate of erosion likely to occur on erosion-susceptible strips are given in the Kansas Agricultural Experiment Station Technical Bulletin 92, 1957.



A strip rotation of wheat, sorghum, and fallow on a sandy loam soil, with strips about 75 feet wide.

Stripcropping at best may reduce the intensity of wind erosion, but not stop it. Alone it has never been sufficient, but merely an aid, in reducing erosion, and especially in preventing soil blowing from spreading to other farms and communities.

Some special precautions must be taken in stripcropping systems. The tendency of soil to ridge on the windward edge of the stubble strips is one objectionable feature. To overcome this tendency the edges of the stubble strips may be disked so the blown soil would be spread over the stubble instead of ridging on the edge. Under extremely erosive conditions, strips may be shifted slightly to one side each year.

Another problem may be weeds growing on the edges of strips. These can be controlled by seeding grain 2 or 3 feet over into the next strip. As the next strip is cultivated later in the season, the cultivator can be extended into the seeded strip, thus killing the weeds that may grow along the edge.

Still another difficulty of stripcropping has been grasshopper and other insect infestations along the edges of wheat adjoining the sorghum or wheat stubble strips. With the advent of modern insecticides and modern spraying techniques, this problem usually can be overcome readily. Information on the use of modern insecticides can be obtained from various entomological institutions.

Some inconveniences of stripcropping are time lost in moving equipment from one strip to another, roads required along headlands to work strips, impossibility of cross-cultivation, and inconvenience of pasturing sorghum strips in the fall and the alternating wheat strips in

the spring. Where extremely large tillage and planting equipment is used, farmers seldom like to practice stripcropping; but, with ordinary equipment there is little complaint.

Under severe conditions of wind erosion many farmers who have adopted the system are convinced that the advantages of stripcropping far outweigh the disadvantages, provided, of course, supplementary practices that must go with stripcropping are adopted too.

More Lamb Chops From Fewer Sheep

A Rancher Reduces His Herd of Ewes and Improves the Range, and Produces More Marketable Mutton With Greater Profit.

By DONALD H. FULTON

“SHEEP ranching was beginning to get pretty tough in the Uintah Basin in the early 1940's recalls Walter T. Smith, a prominent rancher near Fruitland, Utah. “The grass was gone in our lambing pastures, and I was getting a poor lamb crop. I decided that if I was going to stay in the ranching business, I would have to do something to get better production. So I started to do something and the results are encouraging. For example, in 1942, I sold 216,000 pounds of lamb from 4,500 breeding ewes. In 1957, through improved range management, I sold 236,000 pounds of lamb from 2,300 ewes.

“I can remember when there was hardly enough feed over in Section 24 for the deer that came there. I would turn the sheep in there in the spring and could not get enough herders to hold them. The chief forage was sagebrush, and the sheep were looking for green grass. Last spring, I had 600 ewes, 60 bucks, and 12 horses in that area for 35 days, and they took only 25 percent of the grass,” he stated.

In 1946, Walt was running 4,500 head of sheep on his spring-fall range, and there was hardly enough forage to keep them alive. Two years later he cut his herd to 2,300 head and began a range improvement program. With the assistance from SCS technicians cooperating

Note:—The author is range conservationist, Soil Conservation Service, Roosevelt, Utah.

with the Uintah Basin Soil Conservation District, a range survey was made, and Smith developed a range management plan. The main problem area was on his Tabby Mountain-Golden Stairs Range near Tabiona. This 28,000 acre range was used for lambing and grazing before the sheep went to the summer range.

"Even though I cut my herd in half," Walt said, "I knew that the lower dry range would be slow coming back unless I helped it along."

Smith burned off some of the big sagebrush flats and pinion-juniper ridges, and drilled crested wheatgrass. In this 10- to 12-inch precipitation zone, good stands of grass were established.

"When I first began to drill the grass, I was planting at the rate of 8 pounds to the acre, but I have found that I can get as good a stand with 5 pounds per acre."

Since 1950, Walt has cleared and seeded over 1,500 acres of range, which provides early spring grazing for lambing ewes.

In 1953, he tried to burn an area, which was covered with big sagebrush 8 feet tall, but there was not enough understory grass to carry a fire. Smith had this area dragged with heavy railroad rails, which broke the old brittle brush at the ground. Crested wheatgrass was broadcast in front of the railing. Although only a fair stand was established, there is now a good

stand of native forage such as white sage, western wheatgrass and Indian ricegrass. Since then he has railed and seeded more than 600 acres with good results.

"I know I could get a better stand of crested wheatgrass if I disked and drilled the seed, but most of my range has white sage, and I want to encourage it to grow along with crested wheatgrass," he said.

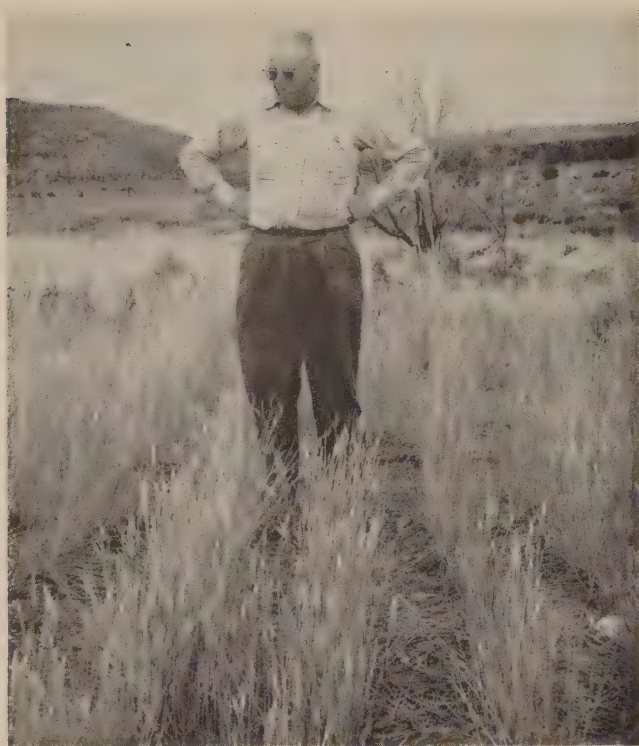
"Herding used to be a problem during lambing time, but now, with about 20 miles of fence and 5 pastures, there is no problem. The sheep are contented and take good care of their lambs. I distribute the ewes into the pastures about May 5, and never bother them until June 10, when we dock the lambs and put them on higher range."

There are several stock watering ponds on the Golden Stairs Range, but Smith found they were not very dependable.

"I have found that hauling water to sheep on spring range has a lot of advantages," he says. "I can get good distribution of grazing in all the pastures by putting the water troughs in areas the sheep are not getting to. I can actually defer grazing in parts of a pasture by rotating my water troughs. There is not much added expense to this operation. My herders don't have to spend much time herding, so they haul water."



Upland range site on the Smith ranch that was covered only with big sagebrush a few years ago. Railing killed most of the sagebrush and permitted forage grasses to cover most of the area.



Walter T. Smith stands in a field of crested wheatgrass that was growing nothing but sagebrush and juniper a few years earlier.

The range survey, made in 1948 by Soil Conservation Service technicians and Walt, showed that 15,000 acres of the range were in poor condition, and 13,000 acres (mostly the higher elevation range) were in fair condition. A recent check shows that only 4,000 acres now are in poor condition, 18,000 acres are in fair condition, and 6,000 acres are in good condition. These figures are more impressive when converted to usable forage.

In 1948, the lower range in poor condition produced only 40 pounds of usable forage per acre when clipped. The reseeded areas on the same range site now clip 400 pounds of usable forage per acre. This indicates an improvement of 1,000 percent. The usable forage on the native range has increased three to four times. The seeded areas have helped to take the grazing load from the native range.

Better forage species are increasing and growing where none were seen 10 years ago. Smith's brother, Tony, recently made a tour of the range for the first time in 10 years and commented that he did not know before that Indian ricegrass grew on the ranch. Species such as slender wheatgrass, bluebunch wheatgrass, and

Indian ricegrass are growing out from under the sagebrush and filling in the open places. Great Basin wildrye and western wheatgrass are beginning to grow in the bottoms of old gullies, which helps to prevent further soil loss.

"A ranching operation has to be different now than it was a few years ago," says Smith. "Expenses were low in the thirties—got some free range—I could get by with a 60 percent lamb crop. Now with high operating expenses, I need a 100 percent lamb crop to stay in business. Now that I'm getting the range built up and have made some changes in my management, I'm doing all right.

"Before I started my range improvement program, the ewes used to shear 8½ to 9 pounds of wool each. Now they average 11 pounds. The lamb crop has increased at least 25 percent. We are now selling heavier lambs. A few years ago, an 80-pound lamb was a good one. Now they will average 85 pounds. Last year was a good year, and they averaged 91 pounds.

"I still have a lot to do to bring the range up to top condition, but it has come a long way in the last 10 years through following improved pasture management practices. I intend to keep seeding some land every year, improving my herd, and improving the range," Smith concluded.

New Wheatgrasses In Utah

By R. DEANE HARRISON

RANCHERS in Utah are desirous of finding new grasses that will improve management on their reseeded areas. Some ranchers are searching for grasses that will fit in with their present native forage. Others are seeking grasses that are drought resistant and will extend the grazing period. Three relatively new wheatgrasses give high promise of filling these needs.

Ernest Herbert of Salina, Utah, for several years felt the need of improved grass species. He has one of the oldest crested wheatgrass plantings near Salina. Since his first plantings

Note:—The author is range conservationist, Soil Conservation Service, Richfield, Utah.

of crested wheatgrass he has seeded several different grass species.

In May 1957, under the direction of Albert Starr of the Soil Conservation Service he planted Pubescent, Siberian, and Whitmar wheatgrasses in different fields. Later, he planted crested wheat nearby to obtain a comparison. All these plantings were successful. Mr. Herbert bases his success on having a firm seedbed, good viable seed, and good growing conditions. Although these seedings were made in May and were successful, he feels that the best time for seeding grass is in the fall, "The same time of year that Mother Nature seeds," is how he puts it. The grass was seeded in rows of different spacing. This was accomplished by plugging different holes in the grain drill. It appears that 14-inch or wider row spacing is best in this low rainfall area of around 12 inches.

These plantings made by Mr. Herbert help substantiate the findings previously made by SCS plant materials centers at Pullman, Wash. and Aberdeen, Idaho, that these specific grasses have considerable possibilities for this section if used according to their capabilities.

Pubescent wheatgrass, which is relatively drought resistant, may play an important role in summer grazing. It looks like intermediate depth of 2 to 3 feet. In some of the heavier wheatgrass, but, as the name implies, it has hairy leaves and seed heads. It is a vigorous sod former. It should be used mainly for range reseeding and should be seeded alone or with Ladak alfalfa. Seeding alfalfa with all grass



Herbert kneeling in a field of Whitmar wheatgrass on his ranch.



Ernest Herbert standing in a field of pubescent wheatgrass on his ranch.

seedings will stimulate grass growth and increase production, lengthen grazing season, and probably increase protein content of the feed.

Whitmar wheatgrass is a native grass and fits in well with bluebunch wheatgrass ranges. It will out-produce crested wheatgrass and is as drought tolerant. However, it takes longer to become fully established. The forage is palatable to all classes of livestock. It cures well after maturity and makes good standing hay for winter use. Whitmar wheatgrass remains green about 14 days longer than crested wheatgrass, thus extending the grazing season.

Siberian wheatgrass is similar to crested wheatgrass, but the leaves and stems are finer. It is more drought tolerant than crested wheatgrass and will stay green about 10 days longer. At the Squaw Butte Experiment Station in Oregon, Siberian consistently out-produced crested wheatgrass for 15 years.

LOOKING AHEAD I can visualize thousands of our small watersheds in the condition that God intended them to be: hillsides guarded with a mantle of trees and grass . . . land on the lower slopes and in the valleys protected by other conservation practices that save soil and hold back water . . . upstream dams, supplementing land treatment, to hold back water when we have too much, and release it when we have too little . . . land in watersheds revitalized; water more plentiful . . . Man and nature in harmony.

EZRA TAFT BENSON
Secretary of Agriculture

Conservation Education in Colorado

By DON KNIGHT

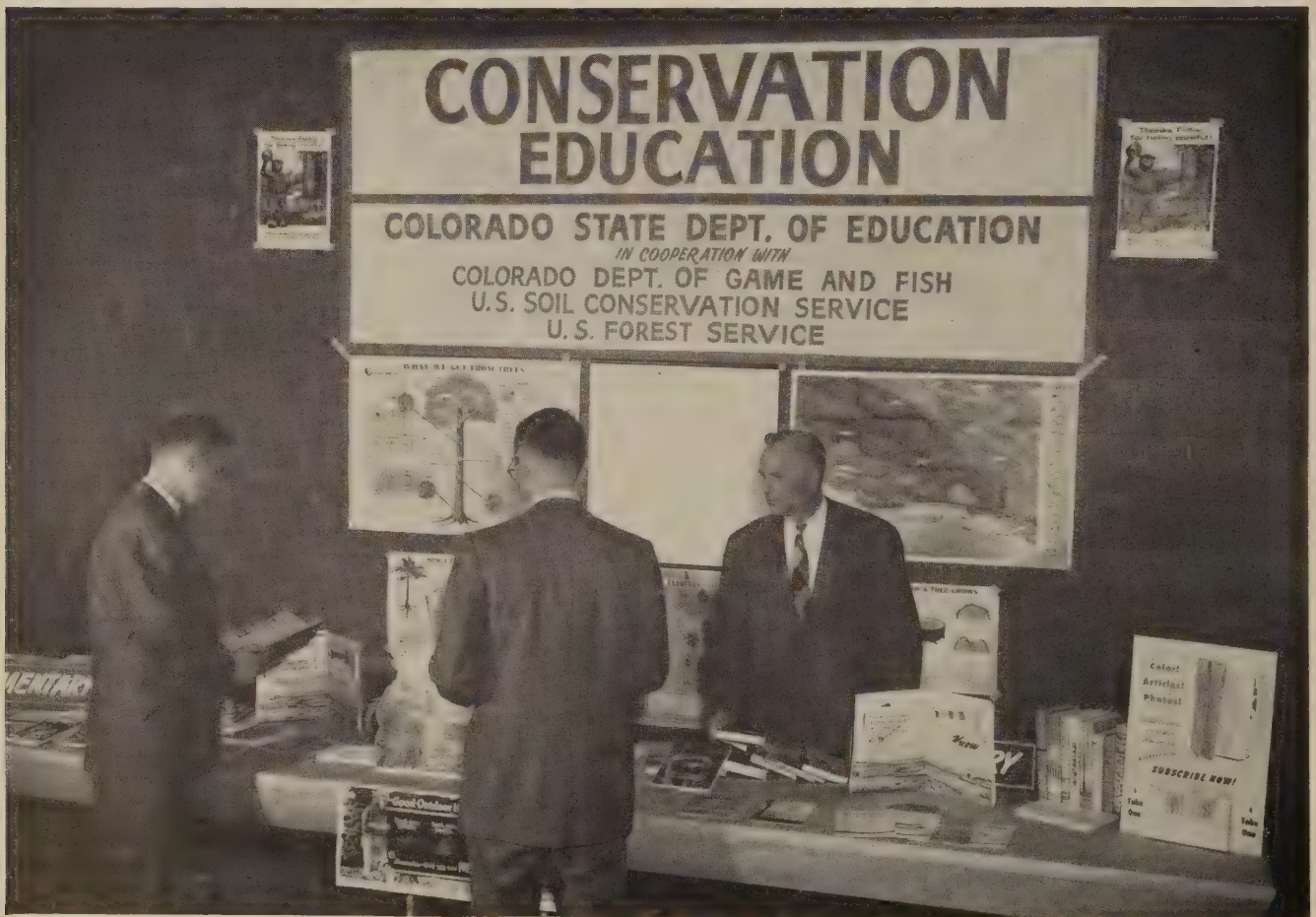
A Cooperative program in conservation education was started in Colorado in February 1956 with the hiring of a conservation consultant by the State Department of Education. Funds for salary plus some incidental expenses were provided by the State Game and Fish Commission. Travel and office expenses and secretarial help were provided by the Department of Education.

The objectives of this program, as set up, were: (1) Stimulate conservation education at

Note:—The author was conservation consultant to the Colorado State Department of Education for 2 years. Recently, he has returned to his regular job as instructor in the Denver Public Schools.

all levels in the schools of Colorado; (2) Assist in the coordination and the development of co-operative programs in conservation education by other agencies; (3) Prepare, collect, and disseminate teaching guides and materials; (4) Encourage research and instruction for teachers through workshops, conferences, and specialized courses; (5) Acquaint school boards and school administrators with the program so that interested teachers may have support for their efforts; (6) Carry on research to determine needs and techniques; and (7) Carry on an information program to keep the general public informed about conservation education.

An initial survey indicated that although much conservation was being taught in some areas of Colorado there was need for a more comprehensive program in most schools. Also, there was need for better materials and more teachers with sufficient background in conservation to integrate it at whatever grade level



Don Knight (right) discusses a display of conservation education materials with teachers attending the Colorado Education Association Conference.

or subject field they were teaching.

Workshops for teachers and administrators were set up in several counties so that educators and conservationists could discuss conservation problems of those areas. Personnel from the Soil Conservation Service, Forest Service, and State Game and Fish Department participated in these workshops. These specialists discussed resource problems dealing directly with the locality in which the teachers were employed. Additional people from the State Department of Education worked with groups of teachers in helping them plan ways of integrating conservation into their present school program.

Conservation materials of all types were assembled and evaluated so they could be recommended for appropriate school use. These materials included texts and supplementary reading materials produced by commercial publishers; State and Federal agency material; and materials produced by private organizations and industries. In addition, free materials from various sources were assembled into packets for various grade levels so they could be used to best advantage by the teachers who received them. These include the most appropriate materials at each grade level from the Soil Conservation Service, Forest Service, and State agencies. About 2,500 of these packets have been distributed to date.

An audio-visual catalog of conservation materials was prepared. This gives pertinent information, such as description, grade level for which best suited, and source of availability. Also, in process is a guide for teachers, which lists desirable attitudes, understandings, and concepts of conservation and suggests school activities that would be instrumental in bringing about these attitudes, understandings, and concepts.

Teacher training in conservation has been given constant attention. In addition to workshops and in-service programs in the schools themselves the conservation consultant worked directly with the teacher training institutions of the State that offer courses and workshops in conservation for teachers. Here again extensive use was made of personnel from State and Federal agencies.

Bulletins are sent out each year giving essen-



Teachers attending a country workshop are shown a concrete-lined irrigation ditch near Rocky Ford, Colo.

tial information on all college courses in conservation available for teachers in Colorado. Consultant service has been provided the institutions in an effort to make such courses more attractive and functional. Through contact with various civic groups, scholarships have been made available for teachers taking such courses or workshops. As a further means of stimulating interest in conservation, exhibits were set up at various education conferences and parent conferences throughout the State.

Another area that has received appropriate attention is that of outdoor education or school camping. This program, which has been developed extensively in many States, has had considerable recent interest in Colorado. In the spring of 1957, a 3-day workshop in outdoor education was conducted. This program, directed by the conservation consultant, enabled many teachers and administrators to explore the possibilities and implications of outdoor education as part of the school program.

At the 1958 annual conference of the American Association for Conservation Information, Colorado received the second place award for its outstanding conservation education program.

LESS BROMEGRASS AND CRESTED WHEATGRASS SEED.—The 1958 crop of smooth brome grass seed is estimated to be 69 percent less than the record crop of 1957 and 7 percent less than the 1947-56 average. The crested wheatgrass seed crop is the smallest in 4 years. It is about 20 percent of the 1957 crop and about 60 percent of the 1947-56 average.

Progress In 1958

By DONALD A. WILLIAMS

LOOK at soil and water conservation accomplishments any way you wish and the United States can be proud of its accomplishments. Look first at some of the physical measures and cold statistics:

More than 116,000 farmers and ranchers starting to cooperate with soil conservation districts . . .

A total of 1,794,411 cooperators in 2,791 districts. . . .

Soil surveys on 41 million acres last year with an additional 12 million acres of range surveys. . . .

Basic soil- and water-conservation plans on 345 million acres—1,218,433 farms and ranches.

One-hundred small watersheds with approved work plans, ready to start or already started on operations under Public Law 556. . . .

A total of 364 watersheds in 46 States and 1 Territory developing work plans. . . .

Farmers and ranchers signing the first contracts under the Great Plains Conservation Program. . . .

Improved systems of stubble mulch farming on 3 million acres. . . .

Improvements in use of windbreaks for erosion control and of wildlife areas on farms, continued development of cultural methods and use of grasses and legumes, more workable terrace systems, continued improvement of water control structures, use of soil survey information for land capability classifications including range sites and to determine the suitability of land for trees. . . .

The above are just part of the accomplishments that can be measured or observed across the country. Farmers and ranchers have written most of them on the land, with technical help from the Soil Conservation Service obtained through soil conservation districts, and with the help also of many other public and private agencies.

But even more important are some less tan-

gible, but equally real, developments in the minds of men and in the public consciousness. One of these is a change in attitude.

Soil and water conservation today is a widely accepted part of modern farming. The public is becoming more interested and is beginning to accept its share of responsibility. From the grade schoolchild to the seasoned rancher and farmer, people believe that modern soil and water conservation is good. They believe it is necessary to maintain our basic resources for the common good—whether it be production of food and raw materials, watershed protection and flood prevention, preservation of wildlife, recreational facilities and water supplies, or a combination of these and other benefits. Soil and water conservation actually is becoming a matter of public welfare and mutual concern.

Like all worthwhile developments in thought and action, this change did not just happen. It came through teamwork among private and public agencies. It came because of the new technologies and more effective combinations of techniques developed over the years by the Soil Conservation Service and agricultural research agencies. It came because of the development of locally organized and administered soil conservation districts and the hard work and clear thinking of men on district governing bodies. It came because of the intelligent understanding and application of newer soil- and water-conservation methods by the men who work the land.

Helping or encouraging the farmers, ranchers, and landowners in various ways are a host of other organizations and agencies. Without the help of all of them, the Nation's soil- and water-conservation program would not be where it is today. Conservation is truly a "team job."

At the national level the Soil Conservation Service works closely with the Agricultural Conservation Program Service, the Federal Extension Service, the Agricultural Research Service, the Forest Service, the Commodity Stabilization Service, the Farmers Home Administration and other agencies in the Department of Agri-

Note:—This article is a digest of a report for the fiscal year 1958 submitted to the Secretary of Agriculture by Donald A. Williams, Administrator of the Soil Conservation Service.

culture. It also maintains close working relations with the Bureau of Reclamation and the Bureau of Land Management of the Department of the Interior, with the Corps of Engineers of the Department of the Army, and with other Federal agencies. Many non-governmental groups participate actively in the National soil- and water-conservation program.

At regional and State levels, the State soil conservation committees, State departments of agriculture, State conservation departments, the land grant colleges, and regional river basin organizations are just a few of the agencies concerned.

Locally, soil conservation districts, SCS, county ASC committees, small watershed associations, county extension agents, county governments, departments of vocational agriculture, and other local agencies work together.

One of the significant features of the soil and water conservation program noted during the year is the increasing emphasis on planned conservation—conservation projects based on definite and specific plans. When we speak of conservation plans, we no longer think only of farm and ranch plans, although they remain the “hard core” or base of the entire program. Most soil conservation districts have always had plans for their conservation operations. But we now have hundreds of small watersheds with specific plans either completed or in the process of completion. County ASC committees and other local organizations with which SCS works are doing a more exacting job of planning. State and regional organizations also are developing specific plans.

Interest in water conservation continues to grow. More and more concern about proper use, management, and conservation of water was noted in many localities. This was due partly to increased competition for water—water for crops, for domestic and industrial use, for recreation. The continual menace of floods helped point up the need for better water control. But fully as significant has been the recent realization that our water resources, though ample for present needs, are limited, and that better dispersion and use must soon become a reality.

The creation of the numerous watershed associations throughout the country and the recent enactment of legislation by most States on water control and water rights attest the

fact that water conservation is becoming of more and more importance. Yet, most of the water conservation protagonists recognize that water conservation cannot be separated from soil conservation. Hence, most water conservation projects are tied directly to soil conservation programs.

State and local governments continue to provide increasing financial and material aid to soil conservation districts and watershed associations. Now we find that State and local contributions amount to about one-third that of the Federal contribution. And the local and State contributions are continuing to grow.

Perhaps one of the most significant developments is the growing realization that rural problems are no longer necessarily agricultural problems. Much land that needs conservation treatment is not farm or ranch land. The intermingling in rural areas of farm and non-farm residents and agricultural and non-agricultural enterprises is creating new kinds of conservation problems.

As extensive rural acreages are taken over by housing developments, factories, airports, highways, defense installations, and recreation centers, a complexity of problems relating to soil stabilization, sedimentation, drainage, sewage disposal, water pollution, tax adjustment, and competition for water supplies arise. All of these problems must be dealt with as a part of the total conservation job.

The urban sprawl, new highways and airports, and other non-agricultural uses of land increase. Unfortunately, these non-agricultural uses often take the more level and better farm lands. As the Nation's population continues to increase this problem will become more acute. We are beginning to realize that conservation planning is no longer just a matter of checking soil erosion and improving soil productivity. Better planning for non-agricultural uses of land is becoming an urgent problem.

The total conservation job is increasing rather than diminishing in scope as our modern civilization develops. Nearly all conservation problems become more complex as population growth and modern technology bring about more intensive and specialized uses of the land. The conservation job ahead seems greater than the conservation accomplishments of the past 25 years.

Soil Conservation Districts

Farmers and ranchers organized 36 new soil conservation districts. This brought the total number of districts to 2,806 in the United States, its Territories, and Possessions. These districts have a combined acreage of more than 1.6 billion acres, of which about 1.2 billion acres are agricultural land. The Department of Agriculture and Soil Conservation Service were cooperating, under memorandums of understanding, with 2,791 districts at the end of the year.

During the year, 116,303 farmers and ranchers, operating about 37 million acres, became cooperators with their local districts. This made a total of 1,794,411 district cooperators operating about 540 million acres.

Soil Surveys

The amount of soil mapping increased substantially over previous years. Altogether, about 41 million acres of soil surveys were completed. This includes 29,331,431 acres of standard soil survey mapping and 11,762,895 acres of soil conservation survey mapping. In addition, 12,850,038 acres of range surveys suitable for ranch planning were made.

Working relationships were continued with the Bureau of Public Roads in the cooperative program for obtaining soils engineering data. In counties where soil surveys are in progress, the Service collected samples from major soils series and sent them to the Bureau of Public Roads for tests of physical properties that are important to engineers. Soils engineering data from 49 counties in 24 States were reproduced and distributed.

Thirty-five soil survey reports with accompanying map materials were sent to the Government Printing Office during the year. Sixteen reports were published.

An outline for the preparation of woodland sections in soil survey reports, including methods for grouping soils for woodland interpretations, was completed. For areas where woodland production is important, future soil survey reports will include soil-woodland interpretations.

The first soil survey reports in a new and more attractive format came out last year. Improvement of subject matter presentation continued.

An addition to the soil survey laboratory was completed at Riverside, Calif., nearly doubling the working space there. A building was started at Beltsville, using Atomic Energy Commission funds, to furnish facilities for determinations of radioactive elements in soils.

Samples of soils, vegetation, milk, and bone continue to be collected in many parts of the United States, and in less detail on a world-wide basis to check fallout distribution of radioactive strontium. Wide variations exist between soils, and studies are continuing to relate the fallout to climatic factors and latitude.

Efforts of recent years to improve and partially revise the nationwide system of soil classification were continued. This work reached the stage of a "6th Approximation", copies of which were distributed and reviewed by a number of soil scientists. Although further revision in certain details will continue, it is expected that

this classification system will be completed and published by 1960.

During the year cartographic work was accelerated, especially in watershed and flood prevention work. Substantial improvements were made in soil map publication to produce maps that are more legible and easier to understand. The Service produced 305,165 prints of soil and land capability maps for 129,403 farms and ranches. In addition, 411,451 prints of conservation plan base maps were produced for 156,832 farms and ranches.

Farm And Ranch Planning

Basic plans were developed on 91,335 farms and ranches, covering more than 27 million acres, during the year. Revisions of basic plans were made on 13,370 farms and ranches covering about 6 million acres. Altogether, 1,218,433 farms and ranches in soil conservation districts now have basic conservation plans for about 345 million acres.

Special emphasis was placed on improvement of the economic phases of conservation plans. Many States developed cost-benefit guides for all common conservation practices used. Several States held farm and ranch planning workshops for SCS employees where the economic aspects of conservation planning were stressed.

Service personnel gave technical assistance in planning, laying out, and checking group conservation jobs. More than 4,400,000 acres were benefited through these group projects. These figures do not include watershed activities on established watershed projects.

Watershed Planning

Applications for planning assistance were received from 175 small watersheds. At the end of the year 46 States and one Territory had submitted a total of 887 applications for watershed planning assistance under provisions of Public Law 556, "The Watershed Protection and Flood Prevention Act" of 1954.

During the year 96 applications were approved for work plan development. This made a total of 364 watersheds in 46 States and 1 Territory approved for planning. At the end of the year, planning had been suspended or terminated in an accumulated total of 51 watersheds. These suspensions or terminations were at the request of the local sponsoring organizations or with their concurrence.

Fully staffed watershed planning parties were operating in 42 States and planning personnel had been assigned to other States, in line with the work load. The Forest Service continued to assign personnel to work with watershed planning parties where the problems required such assistance.

State agencies in 5 States provided \$450,000 worth of additional planning assistance through trust funds, reimbursement, and State controlled planning parties.

Fifty-eight small watershed projects were approved for operation. This brought the total projects approved for operation to 100. Another 26 work plans were com-

pleted and in the review and approval stage at the close of the year.

Work plans were developed for 8 subwatersheds and 1 area of a subwatershed in the 11 large watersheds authorized by the flood prevention act of 1944. This makes a total of 158 subwatersheds plus 1 area, covering more than 14 million acres, that have complete work plans. Planning and operations are proceeding in these watersheds as rapidly as local interests fulfill their obligations in this cooperative effort.

River Basin Planning

With assistance of other agencies, comments were developed for the Department of Agriculture on 18 proposed reports of the Corps of Engineers, 6 proposed reports of the Bureau of Reclamation, and on 1 report of the Public Health Service.

Service personnel represented the Department on the Arkansas-White-Red Rivers, Columbia River, Missouri River, and Pacific-Southwest Inter-Agency Committees and on the Northeastern Resources Committee concerned with river basin planning.

Personnel of the Service, along with those of the Forest Service and Agricultural Research Service, represented the Department in helping the Corps of Engineers review reports and evaluate land treatment practices for flood control on the Delaware River, Potomac River, and Lower Mississippi River basins.

Service personnel represented the Department of Agriculture in its cooperative work with the Board of Water Commissioners of the State of Mississippi and the Kansas Water Resources Board on studies of the Yazoo and Kansas River Basins, SCS, FS, and ARS personnel worked with the land grant colleges of affected States and the Department of Interior in a study of the Colorado River Storage Project.

Planning Assistance to States

Service personnel served as technical advisors to various State agencies, when requested. Such assistance was given to many States, particularly on water rights and water conservation matters.

Many of the States passed legislation during the year that should materially aid in advancing the Department's small watershed protection programs and help simplify some of the water problems in various sections. During the past 3 years, 38 States have passed 80 pieces of legislation directed toward soil and water conservation. In most instances these State laws have broadened the authority of existing soil and water conservation districts or have provided for the creation of other local organizations to deal specifically with water problems.

Land Treatment

Progress in land treatment is not necessarily measured by the extent to which individual conservation practices are used. A true conservation program must be based on the use of all land within its capabilities

and treatment of each tract according to its needs for protection and improvement. Nevertheless, conservation farming or ranching is done mainly by land-use adjustments and by applying individual conservation practices or combinations of practices according to the need. Hence, progress may be determined by measuring the amounts of certain important conservation practices that have been applied to the land.

The following table summarizes the application of some of the most commonly used conservation practices for the Nation as a whole.

Conservation practices newly applied in soil conservation districts, with SCS assistance, 1958.

Contour farming	acres	2,296,854
Conservation crop rotation	acres	7,026,461
Cover cropping	acres	4,144,611
Stripcropping	acres	768,881
Stubble mulching	acres	3,180,221
Terracing	miles	40,986
Waterway development	acres	61,866
Pasture planting	acres	2,983,566
Range seeding	acres	1,295,432
Tree planting	acres	752,113
Windbreak planting	miles	2,383
Wildlife area improvement	acres	488,568
Improved drainage	acres	1,442,564
Irrigation land leveling	acres	460,066
Improved water application	acres	1,290,598
Pond construction	number	63,060

Flood Prevention Structures

Good progress was made in installing structural works of improvement on the 11 watersheds authorized for flood prevention in 1944. During the year 146 floodwater retarding structures were designed, while 131 such structures were completed. This makes a total of 582 of these flood detention structures installed to date with a floodwater capacity of 367,212 acre-feet.

Altogether, 989 stabilizing and sediment control structures were completed this year, making a total of 7,498 such structures now installed on the 11 watersheds. Channel stabilization and improvement was completed on 113 miles, bringing the total to 1,224 miles. Levees and dikes were completed on 1.2 miles bringing the total to 31 miles that required 469,658 cubic yards of earth fill. Roadside erosion control work was done on 195 miles, while 36,468 acres of critically eroding land in the 11 authorized watersheds were revegetated with grass, legumes, or woody plants.

Fifty-four pilot watershed protection projects in 32 States were active. The White Tanks, Ariz., project had been completed previously. During the year, the structural works of improvement were completed on 22 of these pilot projects and 9 other projects were more than 90 percent completed.

During the year 32 floodwater retarding structures were completed on the 54 active pilot watersheds. This makes a total of 240 such structures with 123,222 acre-feet storage capacity. Altogether, 37 stabilizing and sediment control structures and 20 silt and debris basins were completed. This makes totals of 1,592 sediment control structures and 208 debris basins now installed on the 55 watersheds. Stream channel stabilization or improvement was done on 38 miles, bringing the total now completed to 199 miles. Roadside erosion control work was done on 54 miles and 3,077 critically eroding acres were revegetated.

Structural work was started on 90 small watersheds authorized under Public Law 566. During the year, 84 floodwater retarding structures were designed, while 23 such structures were completed. This made a total of 31 floodwater retarding structures with a flood storage capacity of 21,779 acre-feet completed at the end of the year. In addition, 29 miles of channel improvement work was completed and several smaller structures started.

Plant Technology

Much progress was made during the year in the plant technology phase of SCS activities. The progress was not confined to any particular region or section of the country, nor to any specialized field of plant technology.

In the Great Plains an improved mulch system of farming emerged as one of the most important practices to protect dryland crop fields against wind and water erosion. Farmers started to practice stubble mulching on nearly 3,000,000 acres during the year.

Alternate row seeding of grasses and legumes to assure better establishment and balanced stands became important. This technique was developed and tried at several plant materials centers in the West with promising results. Seeding in separate rows between rows of adapted grasses gave better stands of weak legume seedlings, such as birdsfoot trefoil.

In the Great Plains considerable progress was made in improved techniques for establishing permanent vegetative cover on fills, spillways, and other critical areas on watershed structures. Steep slopes, especially when facing south or west, and infertile soils on new fills were proving especially difficult to vegetate. Field planting trials, led to marked improvements, especially by: (1) Using good quality seed of adapted native grasses; (2) Seeding with a grass seed drill with depth regulators; (3) Applying non-competitive mulch such as hay or straw instead of planting a nurse crop; (4) Spiking or fastening applied mulch by use of a straight disk or similar machine; and (5) Fencing the area to keep livestock out.

During the year the useful geographic range of several perennial grasses and legumes was extended. The northward ranges of Bahiagrass, bermudagrass, smooth brome grass, Blackwell switchgrass, Ball clover, and Rose clover were extended several hundred miles without serious winter killing, although the severe

cold of the past winter caused some damage to certain plantings.

This year, for the first time, the majority of the field windbreaks planted were one and two rows. Evidence now proves that narrow belts of trees and shrubs spaced at 40 rod intervals give acceptable protection. These narrow belts cost less to establish and are easier and less costly to maintain.

In the forested coastal plains of Arkansas, interpretations of soil survey data showing the suitability of soils for growing trees were completed. Such interpretations are now being used by many landowners as guides for making their land-use decisions and for choosing those woodland conservation practices that will grow bigger and better crops of wood.

One of the outstanding accomplishments in biology has been the development of wildlife habitat on what are known as "cat clays." These are coastal soils extending from New Jersey to Texas. When these soils are drained, the sulfides oxidize to form sulfates and sulfuric acid and the acidity of the soil increases so rapidly that neither crops nor pasture will grow on them.

Techniques have been developed by Service biologists for utilizing these areas in the production of waterfowl. With proper care, browntop millet can be grown and managed for duck food so that there is little danger of producing a high acid condition in such soils. Many of the brackish water marshes, ideally suited for widgeongrass, are managed by diking and flooding with 2 feet of brackish water to create widgeongrass ponds.

The year brought substantial progress toward a better understanding of the kind of soils information needed for range conservation planning, and increased collaboration between range conservationists and soil scientists in the interpretation and presentation of such information.

Engineering

Widespread interest in improved alignment for terrace systems was noted. Farmers are becoming more and more reluctant to farm terraced land unless the spacing between terraces is made uniform so that no point rows are necessary. For good results this usually involves land forming operations prior to terracing. Farmer acceptance of this type of land preparation has been surprisingly good.

The design sections of the field engineering and watershed planning units prepared detailed plans and specifications for about 13.5 million dollars worth of construction work in 1958. To meet future demands more State design offices will be needed and probably more design work will need to be accomplished through contracts with private engineering organizations.

Service engineers developed a method for using electronic computers to compute the parameters needed in the solution of water surface profiles in natural channels. These machines are widely distributed throughout the country, which will enable the Service to make maximum use of this labor-saving procedure.

Engineers are also working on a similar approach for trapezoidal channels. This method should have significant use in the analysis of open channel flow conditions such as are encountered in floodways and irrigation and drainage channels.

New Service standards for "Buried Plastic Pipelines" were developed jointly with industry representatives and issued to the field offices. Considerable progress was made in preparing State guides for both irrigation and drainage.

The Weather Bureau is working on a storm characteristic project under a memorandum of agreement with the SCS. It also is working on a Probable Maximum Precipitation Project" which will provide rainfall-intensity frequency data for the United States west of the 105th Meridian.

The U. S. Geological Survey, in cooperation with the SCS, is working on 2 projects on the compilation of rainfall and runoff records from watersheds with areas of less than 400 square miles.

The ARS, Bureau of Reclamation, and the SCS established a work group of hydrologists at Lincoln, Neb., to undertake a 5-year study of procedures for assessing the influences of various factors on watershed water yield. They hope to develop a method for estimating quantitatively the effects of land use changes and treatment on the yield of water from small watersheds.

Great Plains Conservation Program

The Great Plains Conservation Program was officially launched in August 1957. The first contracts were signed in December 1957. During the remainder of the fiscal year, 575 farmers and ranchers signed contracts covering about 1,828,776 acres. Under these contracts, about 60,000 acres will be retired from cultivation and planted to grass during the next 3 to 5 years. Cost-sharing payments by the Government for about \$394,000 were made during the year, on these contracts. Nearly 2,000 additional applications involving more than 5 million acres had been filed by June 30, 1958.

Snow Surveys

In cooperation with other Federal, State, and local agencies, and private enterprises, SCS obtained accurate snow-pack information on about 1,250 snow courses in the Western States during the winter and early spring of 1958. In addition, information obtained from British Columbia on the snow pack of the upper Columbia River watershed was made available to farmers and other interested people as a part of the spring runoff prediction.

The early spring estimates of the amount of water that would be available for irrigation not only helped irrigation farmers plan their cropping systems, but also informed all citizens of the area regarding the possibility of floods and the probable water supplies during 1958.

Emphasis was given during the year to increasing

forecast accuracy from snow surveys and to providing technical data to water users in a more easily understandable form.

Conservation Needs Inventory

The national inventory of soil- and water-conservation needs is the most comprehensive factfinding job of its kind ever undertaken. When completed in 1960, we shall have the first reliable measure of the size of the conservation job remaining. This inventory should supply the basic information on which the Service and the Department can more effectively carry out all soil and water conservation objectives.

The inventory is being made, county by county and State by State, by a team of Department agencies cooperating with other interested Federal agencies and with State and local interests. The SCS is taking leadership in making the survey and assembling and analyzing the data. In addition to the inventory of land capabilities and needed conservation treatment, an inventory of small watershed project needs also is being made.

Assistance With ACP Work

Technicians of the Service continued to assist the Agricultural Conservation Program Service participants with permanent-type practices on which cost sharing was requested. Certifications for need or practicability, assistance with site selection and layout, supervision of installation, and certification of compliance with specifications were provided on farms and ranches whose operators were participating in this program. Such assistance with the permanent-type practices, as specified in the national ACP bulletin, was given on about 430,000 farms and ranches.

Other Programs

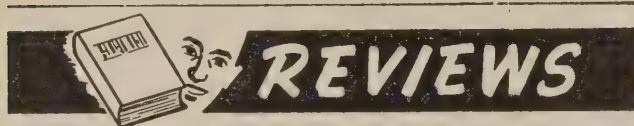
The Service provided technical assistance to about 13,000 Soil Bank participants during the year. This help included general counseling with farmers and ranchers about the Acreage Reserve and Conservation Reserve phases of the program. SCS technicians gave direct assistance to participating farmers and ranchers in selecting lands to be placed under contract and installing treatments for longtime protection.

The Service continued to advise the Farmers Home Administration on the feasibility of conservation loans and gave technical assistance on soil- and water-conservation practices for which such loans were made.

Technical aid on soil- and water-conservation measures was given to participants in the Rural Development Program that is being carried out by the Department to help low-income farmers and ranchers in 53 designated counties and trade areas.

Only one water conservation project, authorized under the Case-Wheeler Act of 1940, was in operation. That was the Eden Valley project in Wyoming. Land development is continuing on the revised schedule adopted in 1956. It is expected that this project will be completed and closed by 1962.

CHANGE OF ADDRESS SHOULD INCLUDE OLD ADDRESS AND CODE NUMBER.



INTRODUCTION TO AGRICULTURAL ECONOMIC ANALYSIS. By C. E. Bishop and W. D. Toussaint. 258 pp. Illustrated. 1958. New York: John Wiley & Sons, Inc. \$5.25.

THIS book provides some very practical and useful analytical tools for use in the field of agricultural economics. While the authors state that the book was written primarily for use by sophomore and junior college students it is our view that the book has possibilities for much wider use by farm managers and economists who are engaged in the field of farm and ranch planning, including the economics of conservation and marketing. Also, the book provides some very useful background information for use by physical scientists such as agronomists, animal husbandmen, and horticulturists.

In fact the book presents the essentials of economic theory, and then quite appropriately shows how to apply the economic theory in the solution of practical everyday problems of farm management.

The book contains four major economic sections. The first clearly describes the functions of our economic system and the significance of agriculture as a part of the system. The second section deals largely with the problem of making actual production decisions on the farm. Such basic economic principles as the law of diminishing returns and marginal product are

clearly explained and their application illustrated through the use of actual examples.

The agricultural economist will find section 2 a very useful working tool in connection with the solution of many of the economic problems he is likely to encounter. Sections 3 and 4 largely deal with some of the overall economic forces that will influence the demand for farm products and with the broad changes in economic conditions that will face farmers over a period of time. Some attention is also given to the trends in population growth and its influence upon the long-run economic position of farmers.

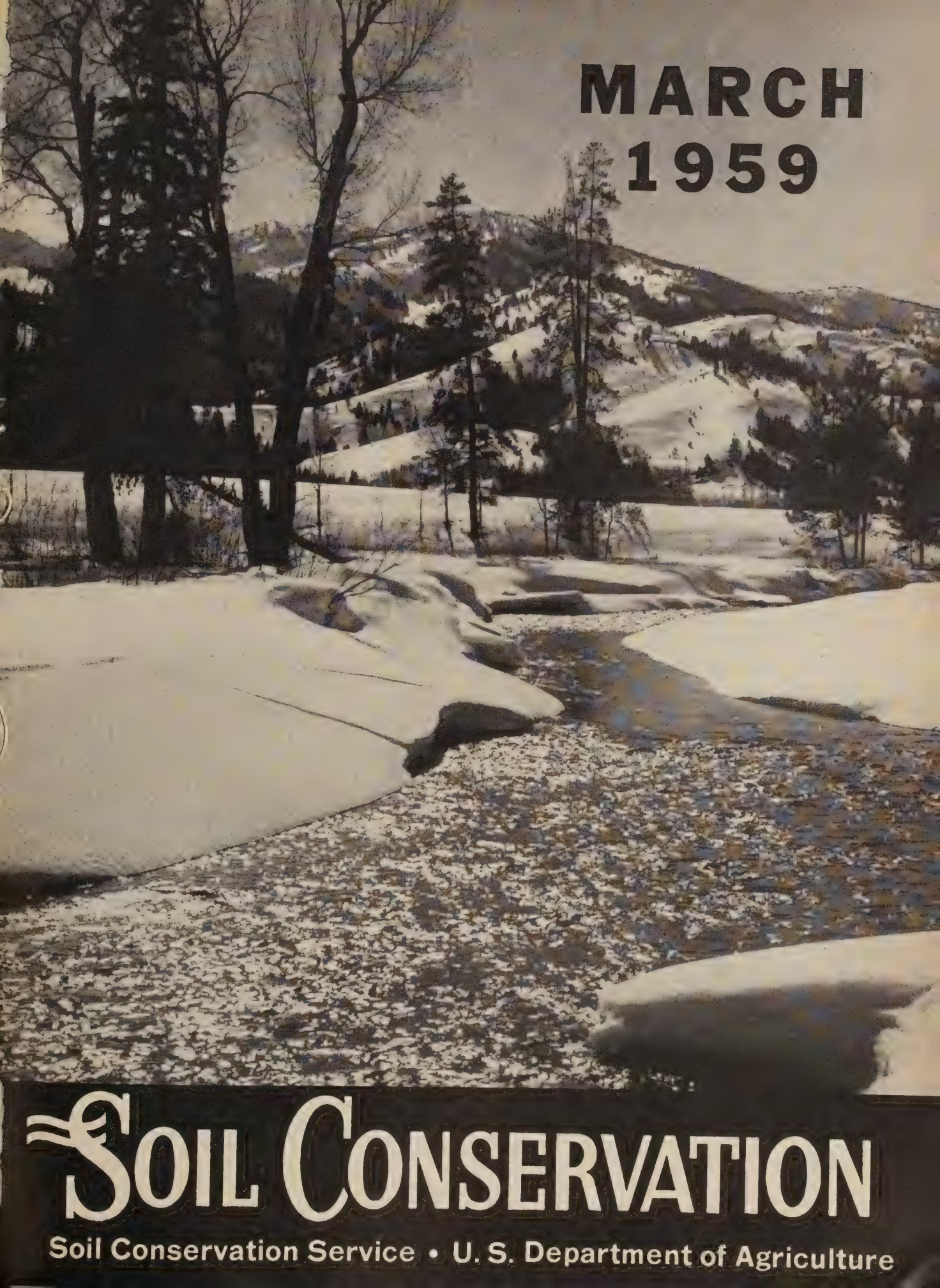
The book is interestingly written, and it is well organized with a good index and many of the seemingly complex economic principles have been reduced to simple and understandable mathematical formulas that can be applied to most actual farm management problems.

—ERWIN C. FORD

CONSERVATION RESERVE.—About 232,000 applications for contracts in the 1959 Conservation Reserve of the Soil Bank were filed in the fall of 1958. The applications call for putting more than 20 million acres in the 1959 Reserve. The National goal for the 1959 sign-up was 12.5 million acres.

WATER SUPPLIES.—The whole country is becoming water conscious to a degree it never was before, not only concerning flood prevention but with respect to agricultural and other water supplies and the growing competition for available water. No longer is water thought of just as "the lifeblood of the West." It is recognized today as "the lifeblood of the Nation."

—D. A. WILLIAMS



**MARCH
1959**

Soil Conservation

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION.

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SECRETARY OF AGRICULTURE

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ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

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TOM DALE, Editor

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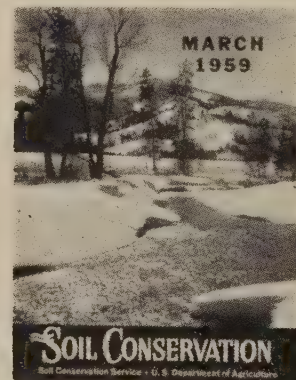
STRIP SEEDING OF PASTURES.—Marvin Kyle, Buncombe County, N. C., farmer, has found the answer to the problem of soil erosion at pasture seeding time. He lays out the field in contour strips and seeds only the alternate strips.

Kyle had noticed that when entire fields were seeded to grass, heavy rains often washed the topsoil away before the sod could get sufficiently established to prevent soil loss.

He brought his problems to SCS technicians who assist the Buncombe County Soil Conservation District. They suggested the alternate strip seeding plan and helped him lay out the strips on the contour.

Kyle is well pleased with results. "I have found," he says, "that when pastures are seeded in alternate contour strips, even runoff from heavy rains cannot build up enough velocity to cause serious erosion."

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—The spring thaw begins on the mountains of central Idaho.
Photo by Robert B. Branstead

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

For Better Times Ahead

Farmers and Businessmen in Parts of Four Counties of Western Kentucky Organize a Conservancy District to Help Restore a 325-Square Mile Watershed to Its Former Productivity.

By KENT ALVERSON

TAKE to the hills, men! Obion's on the rampage again!

For many years, these have been the watchwords up and down the 50-mile length of Obion Creek in western Kentucky. Now, at last, farmers of the area can look forward to the prospect of moving off their erosive slopes back to the safer farming of productive bottomland.

A multimillion dollar watershed protection project, designed to control silting and flooding problems in a 325-square mile area has been approved. This means that more technical help can be provided to speed up the job of getting conservation practices established and structural measures designed. Watershed leaders hope that contracts can be let and dirt moving started by the summer of 1959.

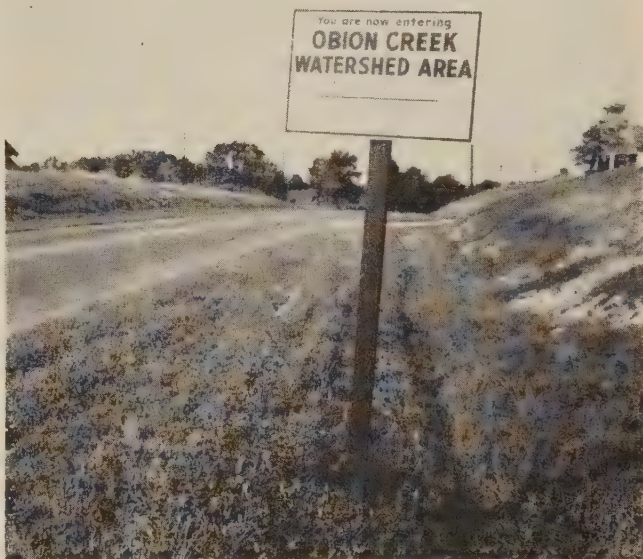
"One of the best things that has ever hit this part of the country!" That's the way Benny Berryhill, secretary of the Obion Watershed Conservancy District, describes the new watershed program.

And that's also the overwhelming opinion of farmers and townspeople. To those who have gambled with the rising waters of Obion Creek to eke out an uncertain living from uncertain crops, it will be the dream of a lifetime come true. To all who live and work in the area it will mean a higher standard of living through more dependable incomes. (At least 75 percent of the farmers resort to outside work to supplement their incomes.) Best of all, it will bring relief and protection to thousands of acres of rolling land not suited for intensive farming.

Obion watershed is a 206,000-acre farming community dissected by Obion Creek and its tributaries. It includes nearly 2,000 farms and

7 small towns in parts of 4 counties. As the crow flies, the watershed is 35 miles long and 10 to 12 miles wide. But, winding Obion Creek traces a semicircular path of about 50 miles from its origin in Graves County near Mayfield to its junction with the Mississippi River near Hickman.

Farms and roads take the brunt of the damage now being suffered. Flooding, silting, erosion, lowered crop yields, and abandoned farms are the main problems. Planning technicians put annual damage from flooding at \$52,000 with an even greater damage of \$95,000 resulting from deposits of silt in roads, bridge channels, crop fields, and drainage outlets. Erosion damages are much higher. They expect the watershed program to eliminate more than three-fourths of silt and flood damages and



The Obion Creek Watershed Conservancy District posts its boundaries along the main highways.

Note:—The author is information specialist, Soil Conservation Service, Milwaukee, Wis.

give an overall benefit ratio of better than 2 dollars for every dollar spent.

Soils around the Obion are windblown in origin and subject to washing at the slightest excuse. Even with protection, sloping upland soils almost "melt away" when farmed. Past cropping with corn, tobacco, soybeans, and hay has taken a heavy toll in sheet and gully erosion. The trend to conservation farming in the past few years has improved the use and care of the land and brought a decrease in erosion. But, as one farmer pointed out, "We can't put back what's already lost."

In the heart of the watershed lies Murphy's Pond, a swampy wasteland of nearly 1,000 acres and the "catchall" for huge quantities of soil and debris. Each year it has spread out over a little larger area as its outlet to the nearby Mississippi River has been further plugged with tons of silt from valley farms.

Benny Berryhill's farm is 2 miles south of Arlington in the lower part of the watershed. It shares typical problems of this area. Nearly half of his 350 acres is flooded from one to five times each year with conditions growing steadily worse.

"At one time we were able to grow from 75- to 80-bushel corn," Benny relates. "Now we get only about 30 because we have to use early maturing, less productive varieties, and we have to plant so late. In fact, we have almost quit cropping and turned the land back to pasture.

"Taxes have gone down from \$251 to \$158 for my farm in the past 10 years, but I'd be happy to pay higher taxes if I could get the production back."

Silting has been prodigious. Said Benny, "There are places in my bottom field that have silted to a depth of 5 feet. There's a hay rake sitting in one corner with only 6 inches of the top of the wheels still in sight. All that silt had to come from somebody's fields."

Similar examples can be found in all parts of the watershed. Warren C. Holt, conservationist for the Soil Conservation Service at Mayfield, has a farm west of Milburn that has been in the family for 60 years.

"My father used to ship corn by the carload out of our bottomland," he said. "It's totally unsafe for any crop now. We have had to go to the hills. And it's almost impossible to keep hill ground from washing, even with good con-



A critical silt producing area on the Dunning farm in the Obion Creek watershed.

servation measures, it will run—slough off—scoot down the hill. It develops big gullies even without any drainage area.”

Holt said he attempted to seed his bottom-land to fescue and clover, but results were discouraging. The clover was eliminated right away, and now 60 of the 75 acres of fescue have been killed out and taken over by swamp grass.

“The last time I worked the bottoms I had three tractors so badly mired down that I had to get a winch to pull them out. It is nothing unusual to see corn pickers left out there all winter.

“Even the hunting is poor,” he added. “People used to spend a lot of time hunting rabbits along Obion Creek. I haven’t been able to find a swamp rabbit in the last 3 years. The same with birds—I used to hunt quail. There is no range in the bottom now at all.”

The Obion Creek community has a long history of flooding troubles. Between Berryhill’s farm and a filling station he operates on the edge of Arlington there was once a complete village called Grafton. The struggle against water problems and low incomes drove the people out. The last house was torn down 10 years ago and it has been 20 years since there was much activity. Scrub timber, broomsedge, and briars have taken over.

There is a long history of “solutions”, too. According to Ode Mullins, landowner and supervisor of the Hickman County Soil Conservation District, a ditch was constructed as early as 1912 to relieve the flooding problem. Other attempts have been made since then. But, without proper outlet, all floodways have been stopped up with silt, sand, and brush in a few years.

Mullins, an old-timer in the region, pointed out that as the bottom got worse, people had to go to the hills. This doubled the problem because harder farming of the slopes increased the washing and caused more silting and flooding in the bottoms. As a result, he said, many farms have been completely abandoned.

Will farmers give their hill land “a break” with a watershed program? “Yes,” says Mullins. “Up and down Obion Creek farms run about half bottoms and half upland. When a



Kudzu on the bank of a road cut in the Obion Creek watershed.

man has both types, he is in a position to take better care of his higher ground.”

Clayton Nunley, present chairman of the conservancy district, has this to say, “Our hill land is under good land use, but the total watershed and flood protection program would let us move off these hills and go back to the more productive bottomland. The water problems in the bottoms are too tough to deal with individually; as a community, we can lick them.”

Both Nunley and Mullins were enthusiastic about the recreational values from artificial lakes to be created as a byproduct of the planned floodwater retarding structures. As Ode says, “Folks are going to fish as long as there’s folks. Some fish for pleasure and some to get a mess of fish.”

Conservancy district leaders are happy with progress so far and the cooperation they have had with the Army Engineers, whose representatives have attended most of their meetings.

In Obion Creek watershed, operations are being planned jointly by the Army Engineers and SCS. The SCS is responsible for planned land treatment and structural phases for the upland and tributary streams, while the Corps of Engineers is developing plans for channel improvement on the main stem of Obion proper.

This type of arrangement gives the maximum in protection and “closes the gap” between the conservation programs being carried out on the individual farms and the huge

task of controlling floodwaters of a large river.

The Obion community is noted for its public-spirited leadership. And because of the common threat to farming and incomes, there has been some kind of formal organization of mutual defense for 15 years.

When the small watershed help became available, local leaders lost no time in organizing for action. They took money left in the treasury of the old organization and held a kick-off dinner for the new conservancy district.

The conservancy district was formed in May 1956 with 14 board members—five from Hickman, the county most affected, and three each from Graves, Fulton, and Carlisle Counties. Meetings since then have averaged one each month, some for educational purposes and some to study new developments in the work plans. Tours have been sponsored to show watershed directors and district supervisors the effects of a watershed program.

Structural phases will take time. Meanwhile, district land treatment programs are going ahead. For example, 60 percent of the landown-

ers in Graves County in the upper reaches of the watershed are conservation district cooperators. Waterways, terracing, treeplanting, ponds, and pasture seeding are moving right along. L. W. Murdock, Graves district chairman, thinks the watershed program has helped put the accent on conservation farm planning and application.

Land treatment measures for flood prevention also consist of 1,103 acres of critical area stabilization, including 16 minor sedimentation structures, and 3.8 miles of roadside erosion control.

Structural measures planned are 14 flood-water retarding structures, including one multipurpose structure with a capacity of 5,480 acre-feet; 11 grade stabilization structures; 14 major sedimentation retarding structures; and 231,200 linear feet of stream channel improvement.

Plans are for a 5-year project costing \$5,906,000 for installation with \$3,975,000 of this to be borne by local interests.

SEDIMENTATION IN THE LOESS HILLS AND TERRACES OF THE LOWER MISSISSIPPI BASIN

No. 43

This is the forty-third of a series of articles to appear from time to time in explanation of the various phases or research being conducted by the Department of Agriculture on problems of soil and water conservation.

By RUSSELL WOODBURN

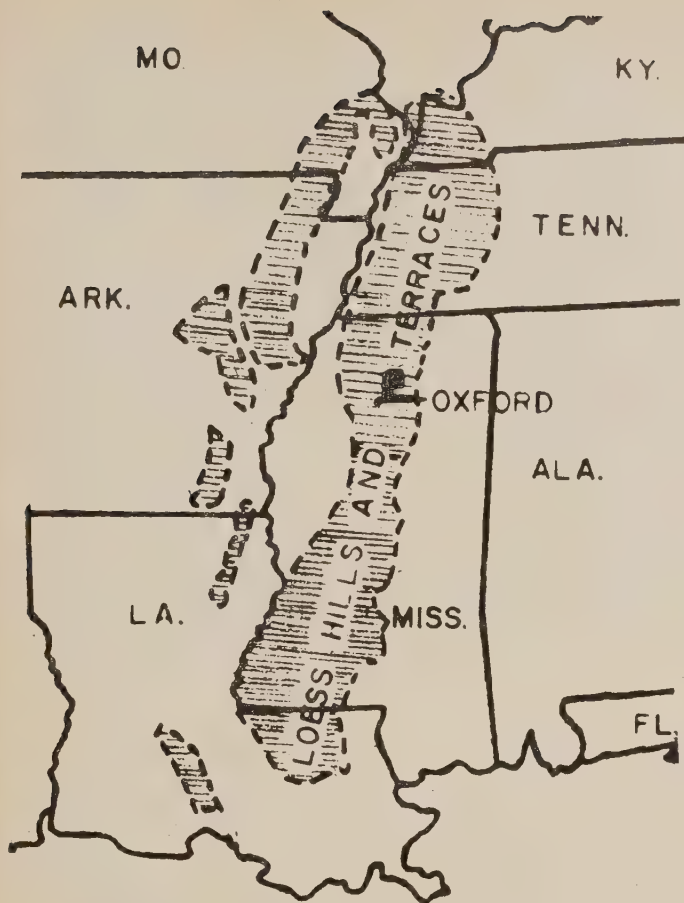
THE upland part of the Yazoo River drainage basin in Mississippi has suffered extensive erosion damage, particularly the loessial soils in the hills just east of the Delta. Lo-

cally known as the Brown Loam area it has a loessial cap varying in thickness, which is highly susceptible to erosion. In places the loess is thin and when cut through may expose unconsolidated sand formations. These sands have been the source of thousands of tons of sediment, which has filled stream channels and has been deposited on the bottom lands.

The widespread erosion and sediment problems are of concern to the Soil Conservation Service in carrying on an active program of flood prevention in the Yazoo River watershed. Of equal concern are local flood damages caused by channels whose efficiency has been impaired by sedimentation.

Generally, the same kinds of problems are found throughout the loess hills and lower lying terraces. This area extends for a distance

Note:—The author is supervisory hydraulic engineer, soil and water conservation research division, Agricultural Research Service, Oxford, Miss.



Loess hills and terraces problem area of the lower Mississippi River basin.

of about 500 miles from southern Louisiana, across Mississippi, Tennessee, and Kentucky to the southern tip of Illinois, with smaller areas west of the Mississippi River, in Missouri, Arkansas, and Louisiana.

Some studies of the erosion and sediment problems in the area were carried on by the former Division of Research of the Soil Conservation Service during 1936-37. This work was reactivated on a limited scale in October 1948 when a small project was set up at State College, Miss. Studies were made on gully erosion rates, channel stability, reservoir sedimentation, and sand transport.

There was gradual recognition that satisfactory progress in a study of these sediment problems could be made only by a comprehensive approach. Accordingly, in 1956 funds were provided the Agricultural Research Service for a large-scale sedimentation investigation pertaining to the Yazoo Basin and to similar areas

throughout the loess hills and terraces of the lower Mississippi River basin. Following this authorization an expanded and intensified sedimentation research project was set up, with headquarters at the University of Mississippi, at Oxford, in the heart of the problem area.

Immediate objectives of the current research are to determine: (1) sediment production of watersheds of various sizes as related to land use and other watershed characteristics; (2) fundamental processes governing the transportation of sediment, particularly of sand by channel flow; and, (3) the amount and distribution of runoff from watersheds of various sizes and land uses.

Pigeon Roost Creek watershed in Marshall County, Miss. was selected for field study. Gaging stations and sediment sampling stations were established on representative channels and were in operation by January 1957. The drainage areas above these stations range in size from about one-third square mile to 117 square miles.

Records of streamflow and sediment discharge are maintained for each station. The U. S. Geological Survey cooperated with ARS by setting up and operating the stations until July 1, 1958. Since that date the stations have been manned by ARS personnel. Fifteen recording and fifteen standard precipitation gages are in operation at selected points in the 117 square miles of the project area in order to correlate rainfall and runoff.

A detailed land-use inventory is in progress on the 117 square mile watershed. An attempt



Runoff and sediment measurements are made with a Parshall flume, recorder, silt box, Iowa slot sampler, and end tanks below a 4-acre cultivated watershed.



Typical sand producing gullies in the bluff section of the Yazoo River basin.

will be made to calculate gross erosion for the watershed above each of the gaging stations. Consideration will be given to land-use and topographic variables in the watershed and to the estimated erosion potential of each acre. The calculated gross erosion will be compared with the observed sediment delivery for each station to determine a sediment delivery ratio. From such a ratio and a land use inventory, a fair estimate may be made of sediment delivery from ungaged watersheds in the problem area.

Runoff characteristics and sediment produc-

tion of small units of single land use are observed on several watersheds. These watersheds range in size from 1 to 4 acres. Fractional-acre plots were established near the small watersheds for intensive studies of runoff and erosion from pasture and cultivated land.

Thus, runoff and sediment production data are being collected from watersheds ranging in size from less than 1 acre to 117 square miles with many intermediate watershed sizes. Special studies of small reservoirs, gullies, and channels started when the project was at State



Sand depositions on a bottomland field in Lafayette County, Miss., resulting mainly from overflow of sand-clogged stream channel.

College are being continued.

The Sedimentation Research Laboratory, under construction near Oxford, will be a permanent headquarters for the project. This facility will include offices for technical workers and a laboratory for analysis of sediment samples, which run to several thousand per year. Also included is a radiological laboratory where techniques will be developed for tracing sediment with radioactive isotopes. It is planned to develop a similar approach for sampling sediment in field silt boxes and for use in laboratory sediment studies.

A hydraulic laboratory is also planned for model experiments on the processes of sedimentation. A principal feature of the sedimentation laboratory will be a tipping recirculating flume, 100 feet long, for isolation and detailed study of special problems encountered in natural channels.

Preliminary findings of the project indicate that extensive studies may be necessary, in the laboratory as well as in the field, to solve problems of flat sand-bed channels. Apparently such channels do not always behave according to the hydraulic laws for channels with fixed boundaries. There appears to be a tendency toward



A cableway used for measuring water flow and sediment content on a typical stream of the loess hills and terraces problem area of the lower Mississippi River basin.

high variability in the friction of sand beds. The rate of discharge is not necessarily fixed for a given gage height or depth of flow. Since friction may change, velocity may change; hence, the discharge may vary through a rather wide range with no corresponding change in stage.

Another peculiarity of the flat sand channels in the area is the formation of standing waves



A gaging and sampling station on a typical flat sand channel on Pigeon Roost Creek. Equipment includes a continuous automatic water-stage recorder and a depth integrating sediment sampler.

on the water surface for medium to high flows. Relatively high velocities are usually associated with this wave pattern. It is thought that the stream bed is also in a wave form with troughs and crests of waves in phase with the water surface. The bed sand waves are probably of a lower amplitude than the corresponding surface waves, but little is known of a specific nature on this point. Studies are underway

to develop techniques for characterizing the sand bed configuration during standing wave flow as a part of the basic research on the mechanics of sediment transport.

This research program is being carried out by the Agricultural Research Service of the U. S. Dept. of Agriculture in cooperation with the University of Mississippi and Mississippi State University.

The First Twelve Years

A National Soil Conservation Awards Program, Started Because of What A Local District Did for One Farm, Wins Enthusiasm and Acclaim.

By CLYDE SCHETTER

BIG events often have their beginnings in minor incidents—to paraphrase the popular adage about oaks and acorns.

An outstanding example of industry-agriculture cooperation, carried out on a national scale today, is the direct result of an isolated personal experience that took place shortly after World War II.

Reference is to the national Soil Conservation Awards Program sponsored by the Goodyear Tire and Rubber Co., now in its sixth year as a national program and its 12th since inception at the regional level.

The personal experience was that of R. S. Wilson, Goodyear vice president in charge of sales, now retired, who purchased a 150-acre rundown farm in Charlevoix County, Mich., during the war.

To operate the farm, Mr. Wilson took into partnership a young 4-H trained couple, Ernie and Ada Brown. Both had experienced industrial work and city living but were eager to return to the farm.

In an endeavor to make the farm and its small dairy herd self supporting, Mr. Wilson sought the advice of Guy Springer of the Charlevoix County Soil Conservation District.

"Farmer Bob", as Mr. Wilson is known among his Michigan neighbors and friends, was greatly impressed by the revolution on his

farm as a result of following the helpful suggestions of the district directors. He saw in his soil conservation district a model of democracy in action. He observed that the five district directors were public-spirited leaders of the community, active in many other fields, elected to their posts, and serving without remuneration other than the satisfaction of doing an important job well.

With the perception of a professional salesman, Mr. Wilson also noted that little public recognition was being given to soil conservation districts at that time. His inquiries revealed that in 1946 there were but three awards programs, in three States, each sponsored by conservation-minded newspapers.

Thus, the seed of a national conservation awards program was planted. It sprouted slowly at first. Impetus came from discussions among Mr. Wilson, members of his own company, and outstanding men in the conservation movement. Those who made important contributions during the preliminary period of the program's development included Soil Conservation Service men from the Milwaukee regional office, national and State soil conservation district officials, Extension Service representatives, and others.

The prime objective was to devise a practicable means of stimulating soil and water conservation in general; and, at the same time, give recognition to the efforts and accomplish-

Note:—The author is a public relations specialist, Goodyear Tire and Rubber Co., Akron, Ohio.

ments of specific individuals who were doing outstanding work in the field of conservation.

In order to consolidate the many ideas, suggestions, and discussions and develop a concrete proposal for a program Mr. Wilson appointed a committee within his company late in 1946.

Following careful study and evaluation, the committee recommended a number of fundamental principles that ultimately were adopted and have been the foundation of the program to date. These included:

1. **PURPOSE:** To recognize outstanding accomplishment by soil conservation districts in carrying on their normal work and, by a system of competitive awards, to stimulate conservation workers to even greater efforts.

2. **HOW and WHO:** Awards on an annual basis to soil conservation districts for their work of organization, education, planning, publicity, and accomplishment; and, recognition of outstanding farmers and ranchers in each district for cooperation with the governing body in carrying out recommendations made for their individual farms and ranches.

3. **CHOICE OF WINNERS:** Winning district in each State to be chosen by a judging

committee of well-recognized authorities on conservation (Goodyear to have no part in the selection of winners). Judges' decisions to be based on the work records of district governing bodies, rated according to a uniform point system scorecard. Scorecard to be in the hands of district governing bodies during the entire contest period so that at any given point they may know their score and thus work more diligently towards a higher score. The scorecard to be used by the district for submitting its record to the judging committee. When submitting the scorecard, the district governing body to designate the cooperating farmers who had done the most outstanding job of both cooperating with the governing body and of carrying out recommended conservation practices.

It was decided that immediate launching of the program on a national scale would be too large an undertaking. Instead, it was decided to first try out the program in one region.

Region 3 of the Soil Conservation Service was selected, for several reasons. One reason was that the eight States in the Upper Mississippi Valley Region included Ohio, where the home plants and offices of Goodyear are located. This made it more convenient to admin-



R. S. Wilson (second from right) brags about cotton grown at Litchfield Park to eastern cotton-growing guests (left to right) R. T. Ratliff, Miss., N. D. Buck, S. C., and Jack Dunn, Ala.

ister and observe the program during its early growth.

The first Goodyear Soil Conservation Awards program was launched August 1, 1947, and closed on July 1, 1948.

Grand awards included bronze plaques to the top winners in each of the eight States of Region 3 and a vacation trip to the sponsor's 14,000-acre agricultural subsidiary and guest hotel in Litchfield Park, Ariz., for all members of the first place district governing bodies and the three outstanding farmer-cooperators in the first-place districts.

The outstanding farmer-cooperator in every competing district received a framed certificate of meritorious achievement in conservation.

The original plan provided for presentation of grand award plaques at statewide luncheons, held by the sponsor, to which all contestants and members of recognized soil conservation groups within the State were invited.

Participation in the first program was so enthusiastic that it was repeated in 1948-49. However, as a further test, the grand award vacation trip to Arizona was replaced by cash awards (totaling \$10,600) to ascertain relative merits of cash versus the Arizona trip as incentives for participation in the program. The test brought a resounding vote in favor of the Arizona trip and it was restored as the grand award.

In the fourth contest year (1950-51) the program was initiated in SCS Regions 4 and 5 (the Southern and Northern Great Plains States).

After 6 years of experience at the Regional level, a recommendation that the program be made national was approved.

For purposes of the national program the country was divided into 50 competing units to give weight to numerical distribution of soil conservation districts within certain States. Thirty-six units conform to individual State boundaries. Texas is divided geographically into three competing units; Kansas, Nebraska, Iowa, and Illinois into two each. New Jersey and Delaware are combined in one unit as are Vermont and New Hampshire. Rhode Island, Connecticut, and Massachusetts are one unit.

Statewide recognition luncheons were discontinued. A plan was substituted to have Goodyear representatives present grand award

plaques at state-level annual meetings of the soil conservation district organization, and certificates of merit at local district meetings.

Grand awards were restricted to two from each competing unit, with the stipulation that one winner be the outstanding farmer-cooperator within the first-place district and that the other winner be a member of the district governing body, selected by that body for the award. A member of the governing body is not eligible for selection as outstanding farmer-cooperator.

Thus, the program currently provides annual grand awards for 100 individuals, of whom 50 are members of their respective governing bodies and 50 are the outstanding farmer-cooperators from the winning districts in each of the competing units.

During the 6 years that the program was conducted at the regional level, 12,523 guests attended 59 statewide recognition luncheons (in 17 States) at which grand awards were presented—an average of 212 per luncheon.

In the 11 years between 1948-58, a total of 837 soil conservation district supervisors and farmer-cooperators participated in the grand award vacation trips to Arizona.

District and individual grand award winners receiving bronze plaques as permanent symbols of soil conservation accomplishment totaled 582 in the first 6 years when the program was conducted regionally.

An additional 500 plaques have been awarded first and second place districts since the program became national (1953-54).

Framed certificates of meritorious achievement in soil conservation have been awarded to 10,215 farmer-cooperators and members of district governing bodies.

Many States have had 100 percent participation in the program (every organized district entering the program in a single contest year). A special plaque is awarded the State association for this accomplishment.

The current Goodyear Soil Conservation Awards program (1958-59) will conclude on April 30, 1959. The 100 winners again will be rewarded with an Arizona vacation trip.

Each year the acceptance of, and participation in, the program is evaluated. Renewal or extension of the program has, since the beginning, been on a year-to-year basis.

Game Refuge Gets A Conservation Plan

By DONALD J. MINEHART

THERE are few sights equal to that of a flock of geese, as they come out of the setting sun, gliding to a landing on a marsh. Each spring and fall as the flocks migrate from south to north and back to the south, Federal game refuges have served as a haven, a resting place, and a place to feed.

These refuges are located along principal flyways of the country. Refuge personnel are trying to get geese and ducks to use these areas as breeding grounds instead of merely using them as stopovers on the way through. Each year a few more pairs of birds stay on, as the managers of the refuges learn to employ more and newer tools for waterfowl management.

Sand Lake Migratory Waterfowl Refuge, located along the north edge of South Dakota, on the James River, is one refuge that has pioneered in new concepts of wildlife management.

The refuge lies on the eastern edge of the old Lake Dakota bed. The James River is the

boundary of this old glacial lake; the east bank of the river is sandy, the west bank is silty. The river roughly divides 21,450 refuge acres. It flows across this part of the State through the sandy glacial lakebed. There is no valley for the river. At all times it flows but a few feet lower than at flood stage. When it does leave its bank, as it has a number of times, it floods the land for miles to the east. The "Jim" is a slow river here, dropping a foot or less per mile as it winds through the refuge.

In the thirties, when land and labor were relatively cheap, the Department of the Interior's Fish and Wildlife Service bought the land that now comprises the Sand Lake Migratory Waterfowl Refuge. Generally speaking, this refuge lies in an area containing land 3 feet higher than normal river flow, beginning just west of Helca and ending 16 miles south—3½ miles north of Columbia. The refuge varies between one-half and 3½ miles in width. A few of the farmhouses were retained as residences

Note:—The author is work unit conservationist, Soil Conservation Service, Helca, S. Dak.



Aerial view of part of the Sand Lake Migratory Waterfowl Refuge.

for refuge personnel, but most of the buildings were sold or destroyed.

In the early days of the refuge, dams were constructed to increase and maintain impoundments at Sand Lake. Although many lakes or sloughs existed in the flood plain, their size was increased by these dams, also a more constant water level was maintained.

At the beginning of the refuge program, it was felt that the wilder the area, the better it would be for wildlife, especially waterfowl. However, some areas were farmed for winter feed and to encourage the waterfowl to stay on the refuge. Placing more land into crops reduced the likelihood of depredation of cropland adjoining the refuge.



Grassy vegetation in the foreground is alluring to ducks as nesting sites, while the phragmites and cattails in the middle distances attract few nesting ducks.

To bolster the argument for cropland acreage, observations proved there were considerably more ducks and pheasants on the farmed land than on adjacent wild areas. For a time, the cropland acreage figure climbed until it reached about 3,500 acres. About this time, Soil Conservation Service technicians, assisting the Brown-Marshall Soil Conservation District, were called in to help develop a conservation plan for the cropland areas. This plan represented the best thinking of the time, and has been changed only when new developments

in agriculture so dictated. The trend in cropland acreage is now downward. At the present time, there are 3,252 acres being cropped. This figure is based on the land capability and probably will not change a great deal in the future.

Grazing was allowed on about a half dozen areas. Each of these areas represented land that apparently had little wildlife value. Other grassland areas were cut for hay in the belief that it would reduce predator damage.

Herbert Dill, former manager of the refuge, was a pioneer in the studies of grazing and wildlife. Dill's dragging operations (a long rope tied between two vehicles and dragged over the land) pointed to what many wildlife men already suspected. All the accessible areas were dragged including wild areas, hayland, and pasture. (Counts were made as the birds flushed in front of the rope.) The results showed no nests in hayed areas; few nests in the wild areas; and a larger number of nests in the grazed pastures. This was not conclusive proof, but it did bear out wildlife workers' theories that waterfowl liked not only cover for their nests, but also a unobstructed view of the surrounding terrain.

For a number of reasons, waterfowl instinctively use a path from water to nest that is open. But for 16 miles on both sides of the refuge on the banks of the river and marshes stood tall natural reed fences called phragmites. This wetland grass intermixed with cattails and some tall sedges, presented the big barrier to effective marsh edge clearance. Cattle didn't like this plant growth when it was mature and cleared it only where they trampled it on their way to water. The remainder of the time the livestock stayed on the upland sites, where they ate the brome grass and the other cool-season grasses.

So the Soil Conservation Service was called to help revise the existing conservation plan for the refuge. The refuge manager at that time was Howard Huenecke. He needed no selling on soil conservation. He was an ardent believer in it, and fully realized the tie-in between wildlife and soil conservation.

Crop rotations were reviewed and the remainder of the farming land was set up for wind strip operations. More alfalfa was intro-

duced into the rotation and more rye was planted in strips to control wind erosion. The rye crop is readily eaten by ducks and geese, so lease arrangements to compensate the operator had to be made.

Most of the work done by the planning team was on grazing land. All hay production was discontinued except for alfalfa hay on cropland. Fences for new pastures were plotted by using the soils and capability map as a guide. Grasses were checked. Stocking rates were revised.

One thing noted was that nearly all the pastures were being handled as though they were native, warm-season grasses. Yet the opposite was true except for two pastures. The remaining 25 units were tame, cool-season grasses. Stocking rates were low. Actually, the refuge personnel preferred low stocking rates so grazing would be light. This achieved the patchiness they wanted in the upland grasses, but it left the lowland grasses and wetland vegetation undisturbed.

In addition to raising the number of animal units, it was decided to cross-fence most of the pastures. This was because most of the pastures contained two or three separate and distinct sites with livestock overgrazing better species on the better sites. Also, cross fencing



Permanent fences installed on the Sand Lake refuge permit rotation grazing and help increase the value of grassland for waterfowl nesting sites.

had proven effective where temporary electric fences had been tried. So they began placing permanent cross-fences between upland and lowland sites.

From early May to late June or July, livestock are confined to lowland and wetland sites with the main forage being prairie cordgrass, sedges, phragmites, and cattails. In with these are varying amounts of lowland vegetation such as wild barley, but the former species carry at least 90 percent of the load.

The secret is early grazing when the wetland grasses are succulent. Once the grasses are tall and woody, there is no way to get control through grazing. This means that grazing on these species must start by the first of May. In order to learn whether there was any benefit to waterfowl by early grazing, three areas were opened May 1st last spring. The remainder of the grazing units were opened on May 15. This was quite a change contrasted with former opening dates staggered from May 15 to July 1.

It is hoped that studies made this year will give more information on early grazing. It is certain that if livestock are not allowed in pastures until too late, the low and wetland vegetation is unpalatable from the start. The Fish and Wildlife Service indicates it will go all the way on the early grazing recommendations if the studies show conclusive proof that there will be control of marshland vegetation, and a corresponding increase in the use of the area for nesting by waterfowl.



Donald J. Minehart examines a clump of grass on a grazed pasture that should make a suitable nesting site for waterfowl.

Mapping Soils In Alaska

Volunteer Soil Scientists Spend a Summer Mapping Soils on the Kenai Peninsula of Southern Alaska.

By LESTER FOX

THE admission of Alaska to the Union has created new public interest in that land. But long before this new interest developed, soil scientists of the Soil Conservation Service, in cooperation with the Alaska Agricultural Experiment Station and other agencies, had been mapping the soils of Alaska. Now, with Alaska our 49th State, their work takes on additional importance. Their soil survey reports can be used in many ways not only by the people already in Alaska but by the many expected to go there now that the Territory has become a State.

Mapping Alaska soils is no picnic. It's hard work, often under trying conditions. The field

Note:—The author is an information specialist, Soil Conservation Service, Upper Darby, Pa.



Alaskan Brown bears are seldom dangerous except when one surprises them or gets too near their cubs.

work must be done during the short summer season. Different men are chosen each year from among volunteers.

Take the experiences of Soil Scientists George W. Allen of Vermont and Burrell Lovell of Oregon. Working as a team, they mapped 165,000 acres of Alaskan soil as their summer's mission in 1957. Lovell and Allen did their soil surveying on the Kenai Peninsula of south-central Alaska, in the Kanai-Kasilof and Ninilchick Soil Conservation Subdistricts. Each worked in the field during the day. In the evening they did their inking and compared notes on soils they had seen.

"There were big Brown bears around but they were hard to see," Allen related. "The danger was in surprising them, or getting too near their cubs without knowing it. Walking through the tall grass and thick alder patches of the river floodplains, sometimes right in bear and moose trails, was a little risky but it had to be done."

The men knew that other survey teams in Alaska had suddenly come face to face with the big bears on several occasions. As protection against such surprise encounters, the surveyors carried arms on their hikes through the unsettled country. Each was accompanied by an armed aid. The aids helped carry survey equipment and assisted in various other ways. The men never worked alone. That was because they were usually miles from the nearest road and, on the rough forest floor, always faced the possibility of a sprained ankle or worse.

In a large burned-over area the soil scientists found walking difficult and tiring. Down timber and snags made hiking rather difficult. Constant climbing and scrambling sapped their energy.

"When we came to streams too wide to jump or too deep to wade with boots, we had to strip

and carry our clothes and equipment across on our heads," Allen recalled. "Sometimes we had to make two trips."

For part of the job the soil scientists had to travel along the sea beaches by jeep or weasel and then climb cliffs to reach the land to be surveyed. They had to watch their tide tables closely, as high tide covered all the beach in places.

In one area Lovell and Allen used four kinds of transportation. They started the day by driving 30 miles by pickup; the next 3 miles they did by jeep. Then they changed to the weasel for a 12-mile jog. After that they had to depend on their own legs and feet for the final 10 miles that covered their mapping area. They waded two streams, one with their clothes on, the other with clothes and gear on their heads.

Although most of the survey area is now unsettled, much of it is believed suitable for clearing and farming. Unfavorable economic conditions in the past have retarded settlement in their area. With the discovery of oil in the region, there's a good possibility that the market for farm products will improve.

One of the primary reasons for the soil survey in this area is to provide accurate informa-

tion for the use of new settlers in selecting their land. Apart from the muskegs, most of the soils of the Kenai Peninsula are developed in silty material deposited by winds over gravelly glacial outwash or moraines. This silt mantle varies in thickness from a few inches to several feet. The underlying material may be highly permeable loose sand or gravel or may be quite compact and only slowly permeable.

Most upland soils are podzolized, strongly acid, and low in nutrients. After the land has been cleared, even the first crop planted must be liberally fertilized. With proper fertilization, however, the land gives good yields of adapted crops. The crops include small grains, grass, potatoes, and other root and leafy vegetables.

The area had been scouted before Lovell and Allen arrived in Alaska. They were given a preliminary mapping legend. Their principal job was to convert previous soil conservation surveys to a standard soil survey; but, areas not previously surveyed were covered also. After a brief period of familiarization with the soils of the area and a good look at the country from a light plane, the men were ready to strike out on their own. They were expected to recognize and describe soils that were not included in the preliminary legend, and later, to help write



Truck with weasel ready to take off for a day's work at soil surveying on the Kenai Peninsula.

more detailed descriptions.

In a typical day, the men left the cabin at 7:30 for the day's work, each going his separate way with his aid. They usually remained in the field until 5 p. m. Often, though, they did not get through until 6 or 7. After dinner and the dishwashing chores, Lovell and Allen inked the boundaries drawn during the day's survey and stereoscoped slope breaks on the maps to be used the next day. Bedtime came fairly early, usually around 9:30 or 10.

"We did a large share of the mapping in heavily wooded areas," Allen said. "Nearly everywhere in the area was a carpet of moss several inches to a foot deep. We encountered large muskegs often. These we crossed on foot or by weasel." Most muskegs were largely treeless but some supported a dense stand of scrubby black spruce.

The character of the survey area and the location of roads, lakes, and muskegs determined the length of each day's traverse or route of travel. The men planned the route in advance so that each of the slope separations delineated



George Allen mapping soils in Alaska.



Burrell Lovell with full pack starting off for a day's soil surveying work on the Kenai Peninsula.

the night before with the stereoscope would be crossed at least once. Where possible, they walked along slashed section lines, with occasional detours to look at areas off the lines. They found walking easier along section lines, and it was not as hard to keep located. They noted section markers accurately on the maps whenever possible. These were important as control points to keep the maps accurate.

Sometimes a party had to stay out overnight in their pup tents. One week when they were out, it rained every day. Their bedding stayed wet all week.

When operating away from their base camp at Soldatna, they had to pack their tents, sleeping bags, mapping equipment, cameras, a week's food supply, and other necessities on portable pack boards.

"We couldn't get to one large area east of the Kenai River, between the Killey and Funny Rivers, from roads or by walking," Allen recalled, "so we hired a motor boat and canoe."

After boating several miles up the Kenai the party packed inland to a small lake. They had to rest several times as they were toting 60 to 70 pounds of gear through the Kenai burn-area of hills, muskegs, and down timber. They camped near a trapper's cabin and map-

ped the area on traverse lines between the Funny and Killey Rivers.

Soil surveying in Alaska is an arduous job. The men must be highly competent and experienced. Despite the difficulties of the work, the Soil Conservation Service has never lacked for well-qualified volunteers. The feeling of accomplishment that follows an assignment in Alaska has made it for many soil scientists a high point in their professional careers.

RICE AND FISH ROTATION

By A. J. TREXELL

H. H. Harvill, chairman of the board of supervisors for the Arkansas County Soil Conservation District rotates rice, cotton, soybeans, and fish crops on his farm near Humphrey, Ark.

He has constructed a levee around 400 acres of cropland, with cross-levees forming several reservoirs or fields of 40 to 60 acres each. These reservoirs provide water for fish production and for irrigation. They are completely enclosed and are filled by normal rainfall and by pumping from nearby drainage ditches and streams.

The rotation in these fields consists of 1 year in rice or row crops and 1 or 2 years covered with water to a minimum depth of 18 inches for fish production. Harvill states that during the years the land is in fish production the tilth of the soil is improved. With the aid of the minute plant and animal life in the water, a layer of residue is deposited on the bottom of the reservoirs.

He explains his production of fish this way: "I fertilize the water to produce microscopic plants to produce algae to grow more fish, and, at the same time, to increase the productivity of the land." A crop of fish, in Mr. Harvill's opinion, if properly managed may add as much organic matter to the soil in 1 year as a dryland farming operation might add in 40 years.

The fish—minnows, buffalo fish, or a special species of carp—do an amazing job of smooth-

Note:—The author is area conservationist, Soil Conservation Service, Searcy, Ark.



H. H. Harvill near one of his fish reservoirs.

ing the bottom of the reservoirs. Immediately after a reservoir has been drained to harvest a fish crop, rice can be sown on the land by airplane, without seedbed preparation.

"Rice yields have been tripled in some instances through this fish production enterprise," Harvill states. He also pointed out that the alternative land uses following fish production are not restricted to rice. The increased soil fertility is helpful to any crop.

Harvill considers his reservoirs multipurpose. The purposes are: (1) provide storage for irrigation water for other land, (2) control weeds, (3) furnish waterfowl feeding and resting places, (4) contribute to the control of floods, and (5) serve as a recreational area for fishing and hunting.

Experience has shown that the operation re-



H. H. Harvill (left) and Kipp B. Sullivan, SCS technician, in a rice field that produced 100 bushels per acre following 2 years of fish culture.

quires careful management. However, Harvill and other pioneers in this type farming believe that the idea will eventually revolutionize farming on level, slowly permeable soils in Arkansas.

Soil Conservation Service personnel assigned

to the Arkansas County SCD have assisted Harvill plan and apply precision land leveling on a large acreage. He believes that a water-cropland rotation combined with the production of food fish will facilitate his land leveling operations.

Pond For Pasture Irrigation

A 5-Acre Pond Provides Ample Water to Irrigate 20 Acres of Pasture and Furnish Recreational Facilities for Idaho Dairy Farmers.

By VIRGIL S. BECK

CONSTRUCTION of a pond to catch runoff water from their 200-acre farm, near Troy, Idaho, has enabled Willis and Orland Arneberg to convert a low-producing dryland farm into a highly profitable dairying operation.

Water caught in the Arneberg brothers' pond is pumped back onto the land through a sprinkler system to irrigate pastures that support a herd of 55 Holstein cows 140 days a year. This is one of the accomplishments that resulted in the Arneberg brothers being named "Grassmen of the Year" in Latah County in 1958.

"This is the first development of this type in the Latah Soil Conservation District and probably in the entire Inland Empire," stated James M. Rabdau, area conservationist for the Soil Conservation Service. He also points out that around 300 ponds have been constructed in the district, and that there are numerous locations where similar developments could be made.

The brothers have been renting the farm from their father, Harry Arneberg, and operating as partners since 1949, a few years after they returned from service during World War II. Willis, now 36, was a pilot in the Air Force, and Orland, now 31, served with the Infantry, both in the Pacific Theatre. The father, who calls himself retired, still is one of the busiest people on the farm.

The farm dates back to Martin Arneberg, grandfather of Willis and Orland, who migrated from Norway to northwestern Idaho in 1885, and homesteaded 120 acres on Little Bear Ridge, southeast of Troy. He bought an adjoining 80 acres in 1901 to make up the 200-acre farm. His son, Harry, was born on the farm in 1893. Harry worked with the pioneer Arneberg growing wheat and beans, and farming with horses for many years before the advent of mechanized farm equipment.

Harry Arneberg took over management of the farm from his father around the end of World War I. He continued dryland farming of wheat, peas, barley, oats, and other crops common to the area and kept a few work horses and milk cows. He became a cooperator of the Latah Soil Conservation District in 1944, and started using crop rotations that included legumes and grasses.

Soon after Willis and Orland took over the farm, they decided to get into dairy farming. They started with around 25 grade Holstein cows and a purebred herd bull. However, having no native pasture they had to buy hay and keep their herd in the feedlot all the time.

In 1951, the brothers constructed a six-cow milking parlor and milk room according to Grade A standards. They started increasing their dairy herd, getting better producers and culling the poor ones.

The brothers soon realized however, that one of their main problems, if they were to operate

Note:—The author is information specialist, Soil Conservation Service, Berkeley, Calif.

profitably, was to produce their own grass so they could reduce the expense of purchasing hay.

The Arnebergs discussed their problem in 1952 with Soil Conservation Service technicians working with the Latah district. The conservationists found that a lot of water was running off the farm. They suggested that a dam could be built across a draw on the farm to create a storage reservoir to provide irrigation for a lot of grass. The sons discussed the proposal with their father and decided to undertake the project.

SCS engineers designed the dam, which had to be approved by the State Reclamation Department. Construction was supervised by SCS technicians.

Using a bulldozer and carryall belonging to the Latah district, the Arnebergs built an earth dam 400 feet long and 24 feet high across the draw. The dam was built mainly with subsoil material, and excess soil from the excavation was placed in nearby draws to eliminate shallow areas around the edge of the pond. Thus a 5-acre pond was created that is 22 feet deep at the deepest point.

Development of the pond for sprinkler irrigation cost \$6,650, of which \$1,200 was reimbursed through the ACP cost-sharing program. The cost of earth moving was \$3,000, installa-



The Arnebergs (left to right) Willis, Harry, and Orland. Willis is standing in Latah grass, while Harry and Orland are in common orchardgrass. Both plots are irrigated from the Arneberg pond.

tion of the irrigation system cost another \$2,900, and erection of 1,900 feet of powerline to the pump cost \$750.

The irrigation main line is 1,900 feet of 4-inch aluminum pipe. Laterals are 650 feet of 3-inch pipe with sprinklers. It takes one man about 20 minutes to move a lateral. A 10-horsepower, three-phase motor and a centrifugal pump are part of the irrigation system.



Aerial view of the Arneberg dairy farm showing the 5-acre irrigation pond in right middle-distance.

The Arnebergs seeded 14 acres to a mixture of 4 pounds of orchardgrass and a half-pound of ladino clover per acre. Finding later that the pond would provide enough water to irrigate more acreage, they seeded an additional 6 acres to Latah and common orchardgrass with ladino clover and alfalfa. The Latah orchardgrass seed for the trial planting was obtained from the SCS Plant Materials Center at Pullman, Wash. through cooperation of the Latah district.

The Arnebergs start irrigating around June 15, and irrigate five or six times a year, putting on 2½ inches of water in 11½ hours per set. In 1957, they used about 8 million gallons of water, or 1.7 acre-feet per acre. Yet, the pond was still about half full at the close of the irrigating season. They apply 600 pounds of ammonium sulphate fertilizer a year to these pastures in three applications.

The 20 acres of irrigated grasses are divided by permanent fences into 8 pastures of about 2½ acres each, so grazing can be rotated as necessary.

The Arnebergs now have 55 grade Holstein cows, which they believe to be about the right number for their feed production and facilities. They have kept milk production records since 1955. They have found that when the herd is in the feedlot on dry hay they produce 10 to 15 percent less than when they are on irrigated pasture.

The cows are on the 20 acres of irrigated pasture 4½ months, or 140 days, so a ton of hay is saved daily, or 140 tons a year. Therefore, the irrigated pastures replace 7 tons of hay per acre. The records show that when the cows are taken off the irrigated pasture during rains to prevent trampling, value of milk production drops \$8 a day.

The Arneberg herd of 55 cows produced 363,000 pounds of milk in 1957, and they estimate that the 1958 production will be 450,000 pounds from the same number of cows. This gain of around 87,000 pounds is attributed largely to better breeding and culling.

The Arnebergs now consider their Grade A dairy herd and forage production in excellent balance. Last year, they installed a 1,000-gallon refrigerated milk tank, and a 3-unit pipeline milker at a cost of \$7,000. They have 6 milking stalls, so 3 cows are milked while another 3 are being readied. The milk goes direct from the milker into the refrigerated tank, and then is pumped into the milk truck for transporting to market.

This year, the Arneberg 200-acre farm included the 5-acre irrigation pond, 20 acres in irrigated pasture, 37 acres in wheat, around 100 acres in grasses and legumes for hay, a 3-acre calf lot, and 15 acres in timber and the farmstead. In addition, they rented 80 acres across the road, which had 30 acres in clover



Sprinkler irrigation system on the Arneberg farm.

and alfalfa for hay, 17 acres in fall wheat, and 28 acres in barley.

They plan to rotate wheat and barley on dry hay acreage, and eventually will change some dryland to irrigated pasture. If necessary some irrigated pastures will be plowed out to renew the stand. They also plow out enough clover and grass each year to take care of their wheat allotment.

The Arnebergs have found that crop rotations are increasing wheat and barley yields, the wheat now averaging 35 to 40 bushels to the acre.

They have two upright concrete-block silos, 16 feet in diameter and 35 feet high, in which silage of clover, alfalfa, and grass is stored. In addition, they have a shed for storing hay. In 1957, they used 57 tons of their own hay, and bought an additional 125 tons. In order to provide more storage for silage, they plan on raising the height of the 2 silos to 50 feet. This will increase the storage capacity from 425 to 625 tons.

In addition to making possible the 20 acres of irrigated pastures, which are the lifeblood of the Arneberg's dairying operation, the pond also provides recreation for their families and neighbors. The pond and pastures also provide food and a rest area for migrating ducks and geese, and numerous deer have been observed coming for water. They also plan on stocking the pond with fish.

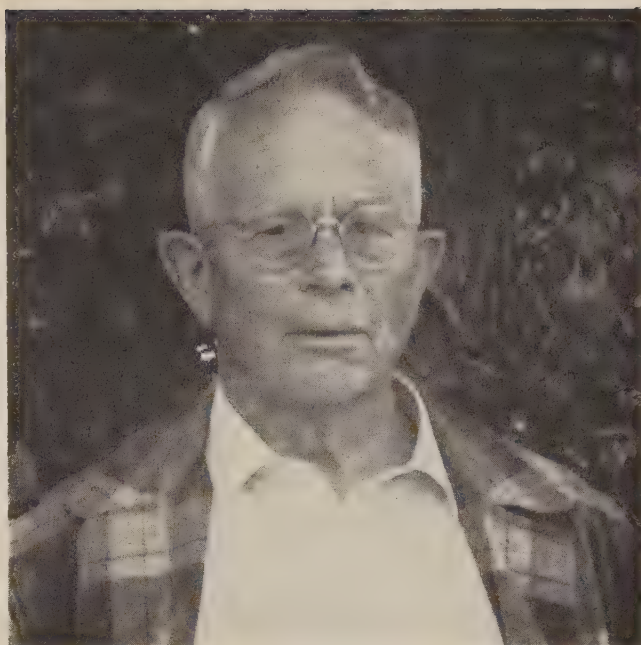
Steward Of The Land

By HERB BODDY

SINCE the Washington Soil Conservation District of Oregon was voted in back in 1955 and Max Reeher was installed as the district's first board chairman, an evening prayer has softened the hard core of all business meetings of the supervisors.

Max, a deacon in the Forest Grove Congregational Church, says, "We're not aiming to sell religion to our board or get 'preachy' about things. We just feel that it's right to ask the Lord's blessing before tackling our tough soil and water problems."

Note:—The author is information specialist, Soil Conservation Service, Berkeley, Calif.



Max Reeher.

Early in May we found Max in the parlor of his vine-covered hilltop cottage talking shop with SCS Technician, John K. Anderson. From a picture window we looked down on fertile Tualatin Valley farms. And on the crest of the distant Cascade and Coast Ranges stood those mighty mountain sentinels—Ranier, Adams, St. Helens, Hood, and Jefferson. Max and his wife Mildred wouldn't trade their eye-opening view for a Swiss chalet.

Max Reeher put in 37 years as an entomologist with the old Bureau of Entomology and Plant Quarantine (now under ARS) in Forest Grove before settling down to the quiet of his cottage.

Max's friends weren't surprised when they heard he was out helping organize the 450,000-acre Washington SCD. He had always been a hustler!

Today the district's soil conservation problems shape up as one of his biggest volunteer interests. Nut and fruit growers have already voted in one addition to the district and a referendum recently held included the rest of the county under the district banner.

Max isn't a big-time operator. He owns one of the many pint-sized farms in northwest Oregon. His small pasture is well-kept and his white face cattle look good and fat.

CHANGE OF ADDRESS SHOULD INCLUDE ZONE, OLD ADDRESS, AND CODE NUMBER.

His chief business is a half-acre of hybrid tree peonies—"largest planting west of the Mississippi." Hybrids from this rare variety are grown from seed and take around 5 years to bloom. Flower raising has grown from a pleasant, free-time hobby to profits which now amply cover growing and marketing costs, plus a little extra.

Each year around May Day, Max and Mrs. Reeher are host to daily crowds of 200 or more visitors who come from miles around to see the colorful blooms.

With cattle and peonies to care for, most folks would let things go at that. But for a number of years Max has been a woodland grower too.

As president of Reeher's, Inc., a family enterprise, and cooperator with the North Tillamook SCD, he has the long-range job of replanting about 274 acres in the old Tillamook Burn near his birthplace on the Wilson River.

The woodland project is being managed as a certified tree farm and Max and the Reeher's hope to reap a good profit from timber before many years. Max has personally planted a good share of the 75,000 fir and spruce seedlings that have gone in since the reforestation work began in 1947.

With all his other interests, Max has found time to serve three terms as chairman of the Washington Chapter of the Izaak Walton League, teach a Sunday school class, sing in the choir, and go to meetings of the Portland Men's Garden Club.

But, above all, Max Reeher likes to think of himself as a good steward of the land.

NEW KIND OF FLOOD DAMAGE.—About the time the French Creek Watershed work plan was completed in the State of Washington in November 1958, a 50 year frequency rain storm hit the watershed. The heavy fall rains saturated upland soil profiles and also melted early snow on the Cascade Range with resultant heavy flooding of valley bottoms.



Peat islands floating on floodwaters of French Creek.

During the course of checking damages and high water marks, islands were noticed by SCS technicians where high ground did not exist. The mystery was solved when the islands moved with the current. They proved to be large bodies of floating peat which had broken loose as a result of dry summer soil conditions and had popped to the surface when the land became flooded. Many acres were therefore left with deep, extensive excavations, and other areas were covered with peat hummocks as the water receded.

—F. A. Mark

FEDERAL LANDS TO ALASKA.—Under terms of the statehood act, the new State of Alaska is granted the right to select 400,000 acres of vacant lands in National Forests and an additional 400,000 acres of other Federal lands adjacent to established communities. Also, the State is authorized to select more than 100 million acres of Federal land located elsewhere in the State.



APRIL 1959

Soil Conservation

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SOIL CONSERVATION

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★ THIS MONTH ★

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TOM DALE, Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, June 26, 1958. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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THOMAS JEFFERSON—SOIL CONSERVATIONIST.—Jefferson was one of a small group of early conservationists who attempted to keep the soil productive and stable. He was an ardent advocate of a sound agriculture for early America. He recognized the menace of soil erosion and attempted to stop it on all of his farms by using contour tillage, crop rotation, and other conservation practices.

Jefferson owned or operated nearly 4,000 acres near his home at Monticello. Much of this land was inherited from his father, Peter Jefferson, in 1767. The remainder was accrued by Thomas, while still a young man. The Poplar Forest estate of more than 4,000 acres was inherited by his wife in 1773.

Thomas Jefferson was a philosopher, an educator, a politician, a statesman, an architect, and an inventor. But, above all, he considered himself a farmer and seemed to be proudest of his achievements in farming, especially in his soil conservation practices. Unfortunately, too many of his contemporaries did not heed his admonitions about the care and management of the land.



FRONT COVER.—The home designed and built by Thomas Jefferson on his Poplar Forest farm in Bedford County, Va. This 152-year-old house has been preserved much the same as when Jefferson resided there.

—Photo by Gordon S. Smith

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Poplar Forest— Jefferson's Bedford Farm

By GORDON S. SMITH

THOMAS JEFFERSON'S scientific farming methods and soil conservation practices on his Monticello, Shadwell, and other farms near Charlottesville, Va., have been well advertised. Little has been written, however, about the contour farming, mulching, crop rotation, cover cropping, and other soil conserving practices he carried out on the "Poplar Forest" farm in Bedford County, Va., even though this farm was larger in area than the Jefferson holdings near Monticello.

In Jefferson's day, the Poplar Forest farm about 90 miles southwest of Charlottesville, was

a 4,819-acre tract lying between Lynchburg and Bedford. He inherited this land from his wife's father in 1773.

Jefferson made few visits to his "Bedford Possessions" until 1781. At that time he was forced to take his family there to keep them and himself from being taken prisoners by the British raider Tarleton. Jefferson and his family stayed at one of the farm houses on the Poplar Forest tract while Tarleton combed the Monticello area in vain. After this visit, Jefferson began to take more interest in improving his Bedford farm.

As political popularity increased for Jefferson, he felt the need for a retreat from his

Note:—The author is information specialist, Soil Conservation Service, Upper Darby, Pa.



Poplar Forest farm as seen from the air. Modern farm buildings at left and old Jefferson home at right, with stripcropped field in the distance.

ever-present public. In 1806, while serving his second term as president, he started a new home at Poplar Forest. The home was similar to Monticello but much smaller in size. This home still stands.

In the years that followed, Jefferson spent more and more of his time at Poplar Forest. Only the closest of friends were invited to the retreat. Much of his writing was done there. His interest in agriculture and conservation increased as his years at the farm went by. In one letter he wrote, "No occupation is so delightful to me as the culture of the land."

After Jefferson's death, the major part of Poplar Forest was passed down to his grandson, Francis Eppes. Later it was passed on to the Hutter family, who had been Jefferson's neighbors. It stayed in the Hutter family for 118 years until James Watts, Jr., a Lynchburg lawyer, purchased the remaining 1,003 acres and the old home from the Hutter estate.

It was Mr. Watts, with his interest in good land use and modern conservation farming, that brought Tom Jefferson's conservation dreams to life again on his old farm. The fields had been idle for years. Gullies scarred the rolling hills that used to produce tobacco, corn, wheat,

and clover for Jefferson. The entire farm was in poor condition.

Watts' first step was to sign a cooperative agreement with the Blue Ridge Soil Conservation District. This made him eligible to get technical help from the local Soil Conservation Service technicians assigned to the district. Being a lawyer, not a farmer, Watts wanted a good farm manager to make something out of his 1,003-acre run-down farm. In 1950, Elmer E. Obenchain, just out of college and just married, took on the farm manager job.

"Put the farm on a paying basis," was Watts' main request. No outside money would be put in the operation. It was a welcome challenge for Obenchain and his up-to-date conservation ideas.

Following the technical advice of Sneed Adams, SCS technician for the Bedford County area, and the conservation farm plan he and Adams made, Obenchain started making the changes that he felt would take the farm out of the red and at the same time protect the eroding acres of Poplar Forest.

Much of the land that Jefferson had used was now covered with a century's growth of trees and brush. According to the conservation plan, most of this land was suitable for crops or pasture. The farm was now an expanding dairy operation. Obenchain needed to expand his crop and pasture acreage. So he set up a land clearing timetable. Each year several acres were cleared. In 8 years he and his two helpers cleared 200 acres of brush and woodland.

Each year, as crop demands and time allowed, Obenchain plowed more acres of cropland on the contour. The easy roll of the land and the soil types make it ideal for contour strips. The farm now has a total of 250 acres of strip cropping plus diversion terraces and grassed waterways that carry off the excess rainwater safely to the nearby stream. The gullies have healed over. Corn, hay, and grain crops planted in rotation in the strips are producing more per acre than ever before.

Even with all this land clearing, Poplar Forest still has more woodland than open land. Managing a total of 420 acres of woods is an important part of the farm plan. Added to this are a few fields that were too steep or too badly



Elmer E. Obenchain, the present manager of Poplar Forest farm.

eroded to farm. These areas are being planted in trees or wildlife shrubs. The wildlife shrubs serve the double purpose of protecting the land from erosion and providing feed for wildlife during winter months.

Today, 75 head of Holstein cows graze the 185 acres of improved pasture. A modern milking parlor and bulk milk tank handle the milk production. Obenchain plans to increase the size of the herd gradually as the farm shapes up.

In normal years, Obenchain has an ample supply of hay for his herd. In dry years, he may buy some. To eliminate this problem, plans have been made for a 5-acre farm pond to be

built near the old home. An irrigation system drawing water from this pond will keep the crops going during dry summer months, and the historic old home will have some much-needed fire protection too.

After 8 years of meeting the challenge, Obenchain has pulled the farm out of the red. The conservation practices that Jefferson wrote about are proving themselves. Looking across the contoured fields and green pastures from the picturesque old home, one can't help thinking that Tom Jefferson would be quite pleased to see his conservation dreams coming true on his Poplar Forest farm.

Productive Partners— SCDs and FFA Chapters

By CLAUDE D. CROWLEY

COOPERATION between soil conservation districts, Vocational Agriculture departments, and SCS technicians in Tennessee has paid off blue-chip dividends in the form of on-the-land conservation. Each organization, doing what it is best qualified to do in a coordinated program, has given a surprisingly large boost to the other.

In west Tennessee's Chester Soil Conservation District, a program was systematically carried out by the district, Chester County high school's FFA Chapter, Vo-Ag Instructor A. C. Jones, and Soil Conservation Service Technician Richard Kirby.

The cooperative objectives were outlined at a get-together with the Chester Future Farmers of America and their fathers. Kirby then spent 2 days in classroom instruction with the high school's four agriculture classes. Later, the FFA boys spent a day in the field with Kirby, Jones, and Soil Scientist Bill Brown. Result: Every family represented in the FFA applied for a conservation farm plan. The maps are being made and the plans worked out as rapidly

as possible.

"Cooperation from Vo-Ag Instructor Jones and the FFA chapter has been splendid," Kirby commented, "and our geared-together program has made our job a lot easier and more productive."

In a similar program, the Carthage FFA



SCS soil scientist discusses soil type, slope, erosion, and land capability with members of the Carthage FFA chapter.

Note:—The author is work unit conservationist, Soil Conservation Service, Knoxville, Tenn.

Advisor, Nathan Bastain, met with the Smith SCD board and enlisted the supervisor's assistance in outlining the conservation problems, which were of concern to his boys. SCS Technician R. L. Dudney and other agricultural workers helped.

After problems were brought out into the open, the group cooperatively set the objective of making a farm conservation plan on each chapter member's home farm. Making a basic farm plan and giving full assistance in applying it was considered to be the best way of teaching soil conservation to the boys and combatting the soil depletion problems.

Maps for the 40 farms were provided the boys, and they were given classroom and field lessons in their use. They then took the material and information home and started working out plans with their fathers. A visit was made later by Technician Dudney to help complete the conservation plans.

"These father-son teams did a bang-up job of making sound land use and treatment decisions," Dudney said.

Accomplishments by the Carthage FFA Chapter include: 40 farm conservation plans developed, 20,000 tree seedlings set, 10,000 plants for wildlife food and cover, 2,500 trees planted on the county hospital grounds, and cooperation in the forest fire control program.

In the Knox SCD, over 50 percent of the



FFA boys of the Dickson chapter clearing site for a waterway on the home farm of one member.

district's conservation farm plans have been made as a direct result of SCD-Vo-Ag activity since they started working together 3 years ago.

The district's five Vo-Ag instructors got together and asked the SCS technician to assist them in teaching conservation and land-use planning. This was suggested by Dr. A. J. Paulus, agricultural education professor at the University of Tennessee, who was helping the teachers work out their programs. The resulting meetings, at both the high school classes and the adult evening classes, brought the programs closer to each other. There was a natural rise in interest from the FFA boys and their parents. The district received a terrific surge of applications for conservation farm planning assistance.

"I consider this a wholesome example of how two agencies can help each other," Dr. Paulus commented, "each doing what it is best qualified to do for the other. The instructor is usually on closer, more amicable terms with his community's farmers than the technician. The conservationist has at his fingertips soils and technical information that he readily provides."

This kind of cooperation has led to the profitable promotion of worthy projects in many districts. In Tipton SCD, the FFA chapter distributed Soil Stewardship Sunday material for the board of supervisors. The board bought the stewardship publications from the National Association of Soil Conservation Districts, and



Ronald Conrad (Center) of the Newport FFA chapter shows judges of the Cooke SCD Conservation Contest a cover crop recently established.

delivered them to the FFA chapter. Chapter members took materials for each church represented. These were delivered to the ministers by the young men.

"This would have been a terrific job for the board alone," Billy M. Johnson, work unit technician, explained, "and they would have had to contact many ministers with whom they were not acquainted. This way, the job was made easy as the minister was encouraged to have a Soil Stewardship service by a member of his own church." The coverage was complete and the results exceptionally good.

The Cosby, Parrottsville, and Newport FFA Chapters in Cocke district made the Soil Stewardship Sunday observance more meaningful and effective with the same arrangement. In addition, the Cocke chapters carried on a comprehensive educational program to stimulate conservation interest throughout the county. The chapter members competed against each other in a Soil and Water Contest sponsored by the board of supervisors. The Future Farmers were judged on the quantity and quality of conservation work they had helped install on their home farms.

The Dickson chapter outdid them all in stimulating interest in a Soil Stewardship Sunday service among the county's ministers. They took the preachers to the field on a conservation farm tour.

Last year represented a turning point in the soil conservation district-FFA relations. Up to 1958 individual programs were worked out in each district. Most of Tennessee's 93 districts were cooperating with the Vo-Ag departments with a local arrangement, but each was individually worked out, and there was little exchange of ideas. In 1958 an opportunity was provided for coordination on a statewide basis. The Bankers Service Life Insurance Company of Oklahoma City, Okla., in cooperation with the Tennessee Association of Soil Conservation Districts, offered prizes totaling \$2,500 to encourage FFA chapters to participate in an organized conservation program.

Attractive guide books containing the points on which chapters would be judged and the rules for the program were printed and distributed to all chapters in the State. Most participating districts offered additional prizes on

the local level. Winners from each soil conservation district were judged on the FFA sub-district level; then the State winner was chosen. The top subdistrict chapters received \$25; the State winner, \$200.

Winning was no snap. Chapters were judged on their proposed program of work, the conservation activities they sponsored, conservation measures applied on members' farms, a conservation scrapbook of the chapter's program activities, a report, and participation in a conservation speech contest.

The Rebel Hill Chapter in Warren SCD took first year honors in this program. Their winning activities covered an unbelievably wide range. They sponsored five local conservation tours, and conservation movies for community groups and schools. They had a land judging contest, an essay contest, a speech contest, and a jingle contest.

They shared with the district in sponsoring Soil Stewardship Sunday. They participated in many radio programs featuring the FFA interest in conservation.

In addition to all this, they applied a wide variety of conservation measures to their home farms that affected cropland, pasture, meadow, woodland, and wildlife areas. They built a drainage system. Five members helped build stockwater ponds on their farms. Alfalfa, sericea and other special crops seeded, sod waterways established, contour farming practiced, and many other conservation practices applied.



Charles Patton, FFA member of the Rebel Hill chapter, receives the FFA-SCD conservation award from Philip White, vice president of Bankers Service Life Insurance Co.

The chapter seeded and beautified the eroded school grounds.

Chapter President, Charles Patton, accepted the State prize from Phillip White, vice president of Bankers Service Life on behalf of the Rebel Hill Chapter. The presentation was made at the Tennessee Association of Soil Conservation Districts' annual banquet in Nashville, November 5. Advisor Charley Roy was a guest of the association and received recognition for his outstanding work with the young men of the chapter.

"We are gratified that the participation in the SCD-FFA program was so good the first year," TASCSD President John S. Wilder said, "and we are planning to achieve cooperation for even greater effectiveness next year."

The TASCSD convention adopted a resolution recommending that all Tennessee boards of supervisors contact the FFA chapters in their districts, offer their assistance, and encourage their participation.

Conservation Farmer Of Hawaii

By HERBERT YANAMURA
and HOWARD COOPER

SEISO Otani of Olinda-Kula Soil Conservation District, Island of Maui, received the first territory-wide "Conservation Farmer" award at the 1958 conference of the Hawaii Association of Soil Conservation Districts at Lihue, Kauai. He won out in competition with top farmers from 15 other districts in Hawaii.

Located on the slopes of Mt. Haleakala on Maui, Seiso Otani operates a model conservation farm. Mulching, sprinkler irrigation, asphalt-lined reservoir, crop-residue utilization, and cross-slope farming are some of the standard practices on this farm.

Otani's chief crop is pineapple—among the most delicious produced anywhere. All of his 18-acre crop is mulched, sprinkler irrigated, and cross-slope farmed.

Note:—The authors are work unit conservationists, Soil Conservation Service, cooperating respectively with the Kailua and Kahului Soil Conservation Districts in the Territory of Hawaii.



Territorial Governor Quinn congratulates Mr. and Mrs. Seiso Otani on winning the top conservation award for Hawaii.

He says, "A good mulch has helped us save a lot of moisture in our water-starved section of Maui. Mulching, we've found is the best way to protect soil from wind and water erosion. It adds needed organic matter to soil too and really cuts the weed problem. Installing a 60,000 gallon reservoir and sprinkler system, reduced irrigation time in half."

Equally deserving of the conservation award is Seiso's wife, Tsugie, who puts in her full time on the farm in addition to handling the multitude of household chores. Her efforts play a key role in the successful operation of the 37-acre Otani farm, which has beside pineapple, truck crops, orchard, and pasture. The only operations that require additional help are harvesting and planting of pineapple.

Seiso Otani was born 52 years ago on the island of Maui to immigrant parents who came from Japan in 1900. For many years Seiso's parents were engaged in farming, the occupation he chose for himself. In 1931, Seiso married Tsugie Nagata and later they became parents to two sons. Both sons have received college educations, one at Woodbury College in California and the other at the University of Hawaii.

To further his knowledge of agriculture, Seiso Otani plans to some day travel to the mainland of the United States and to parts of South America and observe farming operations there.

Water Is Worth What It Costs

By FLOYD W. DORIUS

THE 95 ranchers of the Pleasantview Grazing Association in the Oneida Soil Conservation District of Idaho seem to think that livestock water is worth almost anything it costs to get it. At least, they put up about \$2,300 in cash and work to get a stockwater pond that would accomodate about 300 cattle for 3 or 4 months. And, they plan to build more such ponds, some of which may be even more expensive.

The first Pleasantview pond was a community undertaking. The material and labor costs were shared by the grazing association, the Oneida Soil Conservation District, and the Bureau of Land Management of the U. S. Department of the Interior. The Soil Conservation Service designed and supervised installation of the project.

Large areas of summer range in the Oneida district are improperly and inefficiently grazed because of a lack of livestock water. Of the 540,000 acres of rangeland, about 250,000 acres have insufficient water, especially during July and August. Most of the sites available for stockwater ponds have porous soils that will

not hold water without special treatment. A great part of the moisture that falls on these high ranges comes as winter snow. Most of the melting snow water soaks into the porous soils and appears as springs or surface streams only in the valley far below.

For years, ranchers let their cattle graze the range as the snowline receded in the spring. The livestock ate the snow for water as they gleaned the green shoots of forage as fast as they appeared. This practice greatly depleted the desirable forage plants.

After the snowbanks were gone at the higher elevations the livestock were forced to travel 6 to 8 miles to the valley streams for water. Being reluctant to make the trek back to the higher grazing lands, they trampled and exterminated the desirable vegetation in the canyon bottoms where the trails lead to the valley water.

Without water, during July and August, the cattle get thinner and the vegetation gets dustier as the heat, travel, and trampling take their toll. Tired, sore-footed bulls lose interest in assuming their paternal responsibilities. Livestock congregate at the valley cattle guards. If given opportunity, they roam the

Note:—The author is work unit conservationist, Soil Conservation Service, Malad, Idaho.



With all the water gone from upland grazing areas and most of the grass grazed into the ground or trampled out near the water holes, these cattle want to go home if someone will open the gate for them.



A portion of the plastic covered watershed and the bentonite sealed pond in the Oneida district.

highways through cultivated sections gleaning what feed they can as they head for home. Many of these cattle weigh less than they did when turned on the range in the spring.

The Pleasantview ranchers decided that there must be a way to keep much of the snow water on the hills, so that their cattle could use it during the dry summer months. They asked the soil conservation district and SCS technicians to help them solve this problem. As a result, they decided to cover the porous soil on which some snow banks rested with plastic sheeting, and to seal their manmade pond below with bentonite.

They removed all brush and grass and smoothed an area of several thousand square feet where deep snow drifts normally accumulate. They covered the watershed area with polyethylene plastic sheets, weighted down by rows of small rocks and pebbles. They built a rail fence around the entire small watershed and the bentonite sealed pond below to keep the cattle from trampling either. The livestock are watered from troughs below the pond that have automatic flow controls.

True, such developments are costly, but how

much will you pay for a drink of water when you cannot buy it any place else? This project cost \$2,300, including the access road; the budget limit agreed on by the financing parties. For permanency, it should have cost more. The plastic apron covered 16,500 square feet. The bentonited pond below held 234,000 gallons of water. The maximum water depth was $7\frac{1}{2}$ feet. The area was surrounded by a 6-log high, zig-zag fence.

The plastic used should have been covered with pea gravel and tar instead of dirt and rows of rock. Polyethylene is punctured by sharp rocks and sticks. Other materials such as soil cement, tarred tin mounted on treated logs, or a covering of burlap and tar may be better than plastic.

What are the returns of such an investment? What value does the grazing association place on such a development? President Perry Ipsen, range rider Mario Lewis, and allotment user Myron Jones made a start at answering these questions. These ranchers are all cooperating with the Oneida district in using soil conserving practices on their own ranches and farms. Ipsen has been producing, buying, and selling

choice beef with his father and brothers ever since he got his first pair of riding boots. His factual answers were convincing, "The association would like to put in a snow pond each year. We would have put another in last spring had we not used our allotted money for the pump in Wood Canyon as we agreed to do a year ago."

Rider Lewis' answer was: "You tell me how much that project weighs and I'll tell you what it's worth." When asked what weight had to do with it, he bantered, "Well, I've heard some of the association members say, 'It's worth its weight in gold.'"

Getting serious, Lewis declared: "You can look at the cattle this year and tell which ones are watering at the new pond—they have a slicker finish than the cattle trailing to the valley for water. They are 200 pounds heavier." He had noted 250 to 300 head watering at this development. He informed me that one dry year it had cost \$1 a head per month to haul water to cattle.

Rancher Jones is making conservation use of his time until the Soil Conservation Service can help him complete his basic farm plan. With SCS and ACP assistance he has established more than 100 acres of contour strip-cropping on his wheat land—alfalfa grass strips alternating with strips of grain. Just as soon as the grain strips are harvested, his range cattle can be pulled off the public range and grazed on these strips. He will not need to turn the livestock into the fields as early as last



Water trough below pond.

year. He said: "It looks like I can keep the cows on the range a month longer from the looks of the water in the pond. I also expect a better calf crop next year. It seems the breeding season has been extended by that water development."

How profitable is this development? Two hundred pounds of beef times 300 cows plus a better calf crop, plus more range feed are part of the profits. And if the development is maintained, the livestock are not turned on the range before the grass is ready for use, fences are built and livestock are uniformly distributed by riding, salt location, and other stock water developments, the range is going to get better and better and the profits may multiply.

Game tracks show that this water development also is being heavily used by deer.



Plastic apron at the edge of bentonite sealed pond.

LIVESTOCK FEED FROM BRUSH.—Range specialists of the California Division of Forestry have been conducting tests to determine the possibilities of making livestock feed from native brush.

Chemical analysis of one species of brush tested shows it has a feed value similar to oats or sudangrass hay, and is as good as some grades of alfalfa. To make the feed, entire brush plants are cut and ground into meal in a hammer mill, then made into pellets. A small amount of molasses is added during the pelleting process to increase palatability of the feed.

Range Improvement In Australia

SEEDING and fertilizing ranges and pastures by airplane has become a fairly common practice in many sections of Australia during the past few years. Most Australian soils are notably deficient in available phosphorous. Heavy grazing, mainly by sheep, has greatly depleted desirable vegetation on large acreages during the past few decades. Serious soil erosion and declining productivity have resulted on large areas of grassland.

At present, there is great interest among Australians in range and pasture rejuvenation. Recently, a "look-and-learn" field day was held in New South Wales to demonstrate modern techniques in pasture improvement. More than 1,000 farmers attended, some driving hundreds of miles to be present.

Staged at "Gundowringa", a 6,000-acre property, about 120 miles south of Sydney, the field

day gave vivid evidence of the benefits of planned pasture improvement.

The visitors were shown how "Gundowringa" had once been "sorry" country. They were shown a narrow strip of land that had been left untouched and had become near-barren, eroded, and useless. Then they were shown alongside it wide, green swaths of fertile countryside, thick with good-eating grass and no erosion—the result of planned soil and pasture improvement.

A fleet of light aircraft was used to show the latest methods of aerial top-dressing and the advantages of bulk field dumps of super-phosphate instead of bagged lots of fertilizer.

Skimming across the heads of the crowd, the small planes landed right beside the field dumps and were refilled by mobile tractor loaders. It took only a few seconds before each plane was back into the air again and spreading fertilizer across the pastures.

Note:—This article and photographs were furnished as a news release issued by the News and Information Bureau, Department of the Interior, Commonwealth of Australia.



Bulk fertilizer being stored at field dumps so that it can be scooped up by mechanical shovels and transferred to airplane for spreading.

The visitors were shown how the superphosphate in bulk could easily be transported from railhead or direct from the factory to the field dumps. They were shown how wind and water-proof field dumps could quickly be erected.

The ground at the site of a dump is treated with a special oil-base sealer to keep out dampness, and then portable walls and hatch covers are erected. Such field dumps can be used just as easily for bulk-spreading from the ground as from the air. The fertilizer is simply loaded by mechanical shovels into the truck spreading units.

The visitors were told that by using the right amounts of fertilizer combined with sowings of the correct types of grasses they could improve their pastures and lift production to new levels.

They were told it need not take as long as it had at "Gundowringa" because modern methods such as aerial top-dressing and bulk-handling of fertilizer were short-cutting the old procedures.

At "Gundowringa" the pasture improvement program began back in 1904 when the property was first taken over. It was described at that time as "supporting wiry native grasses, virgin and ringbarked forest, and fallen trees intermingling with the meagre grass supply."



Spreading fertilizer on a pasture the Australian way.

The native grass areas of the property carried less than one sheep to the acre and the stock condition was poor. The average wool cut was between 6 and 7 pounds for each sheep. Today the improved pastures carry more than two sheep to the acre—plus lambs—and the average wool clip for each sheep is more than 13 lbs.

Where once the soil was light and poor it is now dark and rich. Where once the soil had been washing away now even the steepest hills are covered with desirable pasture vegetation.



Mechanical shovel loading bulk fertilizer in airplane.

ANTHRAX—A SOIL BORNE DISEASE

By G. B. VAN NESS

No. 44

This is the forty-fourth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

ONE of the oldest recognized infectious diseases of livestock, anthrax, is caused by an organism which will persist for many years in the soil. Although this disease has not yet become as extensive in the United States as in Old World anthrax districts, outbreaks of serious proportions have occurred in 1954, 1957, and 1958. Based on soil prediction studies made by USDA scientists, observations on soil physiography were included in the control of these outbreaks.

The cause of anthrax is *Bacillus anthracis*, a spore-forming bacterium. It is isolated with difficulty from soil, yet its recurrence in definite portions of farm lands in so-called "anthrax districts" is convincing evidence of its soil-borne nature.

Although off-season anthrax may be traced to food-borne or other sources of infection, very few outbreaks occur unless the daily minimum temperature is higher than 60°F. With a daily minimum temperature higher than 60°F., anthrax may be a serious problem in regions where the soil pH is higher than 6. The same limitations are encountered on laboratory media; therefore, the factors are probably physiological, although competition by molds and other organisms in acid soils may be a factor.

Eastern soils, with their lower pH, have from time to time been contaminated without becoming anthrax districts. Western soils, particularly on the Great Plains, show an increasing incidence of the disease. Some neutral glaciated and marine soils of the East have almost annual outbreaks, but of minor importance. This indicates a delicate balance, and strengthens the premise that soil pH of 6 or higher is a prerequisite for an anthrax district.

Serious anthrax outbreaks are often seen when a dramatic alteration occurs in the seasonal weather pattern. The 1954 outbreak on the Mississippi delta below New Orleans accompanied a prolonged, stationary low stage of the river due to drought in the Midwest. The 1957 outbreak in Oklahoma-Kansas occurred after prolonged rain followed by severe dry weather, as did the 1958 outbreaks along the Mississippi River from Louisiana to Illinois.

In studying weather data related to the 1957 Oklahoma-Kansas outbreak, it was observed



Local swelling, due to anthrax. Death usually results. This disease is also common to horses and mules.

Note:—The author is veterinarian, animal disease eradication division, Agricultural Research Service, Washington, D. C.

that a similiar flood-drought situation occurred in 1951, when anthrax was also a problem. The 1958 outbreaks near Monroe, La., were associated with a weather pattern also observed in 1946, when serious anthrax losses occurred in northern Louisiana.

These studies point to the probability that biological conditions contribute to anthrax outbreaks. The absence of any one of these biological conditions serves to limit the appearance of soil-borne anthrax.

The flood-drought combination with high soil pH and high temperature suggest a propagation phase may be involved in severe outbreaks. What we look for is evidence of changes which, when absent, cause no trouble. Usually we find damaged vegetation that is first injured by water, which has stood over the grasses and their roots, and then is left exposed high and dry during a drought that follows the flood. The role of insect carriers is depreciated by the frequent restriction of the disease to small pastures with damaged vegetation. Insects are dangerous spreaders to man, however, especially where they cause wounds in the skin which may then become infected with anthrax organisms. But damaged vegetation is a key indicator of the anthrax potential of an area.

Soil conservationists are usually concerned with limiting water damage to vegetation. The most obvious of these is water damage by flooding streams, and most anthrax outbreaks occur along water-courses. Fine silt dried on dead and decaying vegetation may carry many spore-forming organisms, and it is easy to visualize the presence of the spores of *Bacillus anthracis* as well as the nonpathogenic forms.

Anthrax may also occur away from stream valleys, and in some cases on apparently high ground. Here improperly constructed terraces, borrow pits, buffalo wallows, slick spots, alkali flats, and land slips may produce entrapment areas that resemble small alluvial flats. Almost all of these potentials may be encountered in the anthrax areas west of the Mississippi River.

Ponds which serve as a water supply for livestock have a very high anthrax potential. This was particularly noticeable in the 1957 Oklahoma-Kansas outbreak, since almost all the ponds had been dry and contained growing vegetation. Ponds may contain alluvial flats



Dead grass around a small pond. Eight of 20 cattle that frequented this premise died of anthrax.

which under normal conditions are above water. Under prolonged flow of ground water from saturated soil, the vegetation on these flats may suffer severe water damage. This is so common in anthrax outbreak areas it is suggested that fencing of ponds with the installation of float controlled water tanks may help prevent an outbreak of the disease.

Fairly level but poorly drained land may become saturated to the surface under prolonged rainfall, causing damage to vegetation. The cultivation of this land may be unprofitable, and it may be in permanent pasture. Livestock owners with limited acreage may use lime and



This pond had a much higher water level, causing the death of grass on the silt filled area. Serious losses from anthrax occurred on this pasture.

fertilizer to improve the soil, changing an acid soil toward the alkaline side. This is often observed in cotton growing sections where low ground is usually in pasture, and mules pastured there suffer serious losses from anthrax.

Special conditions brought about along drainage ways may result in conditions favoring anthrax. The spoil of banks of ditches often trap water, forming small or large alluvial areas, which after contamination with anthrax organisms may be the sites of future outbreaks. This potential is quite high in the flatwoods of south and central Florida, where a calcareous marl is found under the acid sands. An expansion of the cattle industry in recent years has been accompanied by drainage of the flatwoods for pasture. An anthrax potential is already known in the area.



A silt deposit in the channel of a diversion terrace that was present on a farm having serious losses from anthrax.

Interestingly enough, anthrax is practically unknown on first-class agricultural soils. The practice of liming good soils, now too acid for many crops, is at present of little concern. One exception occurs, in that rice farming is an agricultural practice with a high anthrax potential. The controls remain the same, however, where resting rice fields are pastured by cattle or livestock.

Soil conservationists are in an excellent position to further the understanding and control of anthrax. The United States is fortunate at the present in having a low incidence of anthrax. What we learn today may serve materially to lessen this potential in the future,

and it may even be possible by good soil practices through the cooperation of soil scientists and disease-control specialists to eliminate this disease as a serious threat to livestock and man.

Supplements To Classroom Work

By ROBERT H. MILLS

THE Divide Soil Conservation District, Ohio, is cooperating with the Crawford County, Ohio public schools to develop a progressive conservation education program for the county. In addition to regular classroom studies on conservation, the district sponsors extracurricular activities among youth groups to stimulate further interest. The supervisors of the district are firm believers in the adage that the leaders of the future are the youth of today.

Major activities in the program to develop tomorrow's leaders are the biennial High School Conservation Field Day for juniors and seniors; the annual FFA Land Judging contest; and the Boy Scout Field Days in forestry and wildlife management.

Other conservation-education activities sponsored by the board include conservation air tours, forage field days, terracing demonstrations, county fair exhibits, farm pond tours, 5-ton hay contest, hay and pasture tours, and annual conservation banquets.

Last fall 550 students and teachers from the 10 rural schools and the Bucyrus conservation class took part in the High School Conservation Field Day at the Ralph Worden farm near North Robinson. They toured the farm and heard conservation leaders explain the conservation practices. The arrival of each school group was timed to permit relatively small groups at each stop. Each tour lasted about 1½ hours. The field day is held every other year to give each student a chance to see and study the management of soil, water, forest, and wildlife resources as practiced by farmers in Crawford County.

Note:—The author is work unit conservationist, Soil Conservation Service, Bucyrus, Ohio.

The Vocational Agriculture students compete each spring in a land judging contest designed to teach an appreciation of soil differences, land capability, and proper land use. The district board, as cosponsor of the contest, awards a prize to the winning FFA team. In 1958 the Lykens Rural High School team won second place in the State Land Judging Contest at Columbus.

Boy Scout Forestry and Wildlife Management Field Days are the most recent conservation-education activities sponsored by the board. These events are devised to teach resource management to both town and country students. They speed up woodland improvement work and enable the Scouts to complete part of the requirements for merit badges in conservation.



County agent explains the layout and conservation plan of the Worden farm to students from Tiro High School.

A recent reunion of graduates of the Ohio Conservation Laboratory at Bucyrus, provided an excellent opportunity for teachers from 16 counties to review local progress in conservation-education work. The laboratory is one of the outstanding workshops in the country for training teachers in conservation. It is sponsored by the Colleges of Education of the five State universities; the Ohio Department of Education; and the Division of Wildlife, Ohio Department of Natural Resources.

Ralph Worden, veteran leader in the local conservation-education program, who helped organize the soil conservation district in 1945 and who served 12 years as supervisor, told



SCS technician discusses soil classification and management with students from Mt. Zion High School.

recently of the contributions made by local groups to the coordinated program.

Worden recalled the excellent cooperation received by the board from local schools, Boy Scout troops, Granges, Farm Bureau advisory councils, the Soil Conservation Service, the Agricultural Extension Service, the Crawford County commissioners and engineer, churches, newspapers, radio, the Ohio Divisions of Forestry and Wildlife, the Crawford County conservation league, and others.

The board reviews each year's program in planning future events. In 1959, a Drainage Field Day will stress tile and surface drainage. A Farm Pond Tour will emphasize fish management and the control of undesirable vegetation.



Crawford County FFA members get instructions from SCS soil scientist on the land judging scorecard.

Wildlife Benefit From Controlled Burning

By H. LEO WILSON

THE Bighorn Basin Wildlife Club looks upon the conservation of wildlife as a job for everybody. Its members insist that the people who live in cities and towns, especially those who enjoy the thrills of good hunting, can help do the job along with the farmers and ranchers. And good hunting, the club members remind you, depends on providing game birds and animals a place to live, and on giving them the food and cover they need to grow and multiply.

The club has gone a long way toward proving this point. It was nearly a year ago that the club agreed all was not as it should be so far as game and hunting were concerned. They decided to do something about it. The game about which they were especially concerned were pheasants, chukar, and Hungarian partridge. Their first move was to ask the Wyoming Game and Fish Commission for advice. George Burnap, Jr., then game warden, Don Johnson, bird technician, and Louis Pechacek, fish biologist, agreed to help.

Food for wildlife obviously was not the problem. Barley and oats are plentiful in the irrigated valley. Sweetclover and sunflower

thrive in odd areas. The main problem, it was found, involved the burning out of canals and ditches each spring, because the fire nearly always destroyed wildlife cover along the ditches. Nesting wildlife then moved to adjoining fields only to encounter more hazards in the sickles and wheels of farm machinery.

So members of the Bighorn Basin Wildlife Club decided to help farmers develop a plan for "controlled burning" of canals and ditches. Club members called on the Washakie Soil Conservation District for help. Dan Herman, assigned by the Soil Conservation Service to work with the district, furnished a map showing the location of farms in the area. On the map, the club marked off 13 areas and picked a field captain from its membership for each. Each captain picked a team. Team members knocked on farmhouse doors, asking for permission to supervise the burning of the canals and ditches on each farm. When the farmers understood the aims of the club, they readily consented to the idea. Most of them, like the club members, were interested in the conservation of wildlife.

At burning time, crews armed with torches and wet sacks moved in to burn weeds and trash in the canals and ditches. They confined the fire to the ditch proper. However, this was a slow, tedious way to do the job. Somebody thought of a truck-mounted sprayer which the Pure Gas Company used to control weeds on their tank locations. The company agreed to lend the tank to the club and also gave the club the use of a 15-gallon high-pressure butane

Note:—The author is State soil conservationist, Soil Conservation Service, Casper, Wyo.



Bighorn Basin Wildlife Club members burning weeds from an irrigation ditch.

A Decade Of Service

By W. L. VAUGHT



Irrigation ditch after burning, with wildlife cover left on each side of ditch.

burner. The two pieces of equipment made an effective combination. The Game and Fish Commission loaned the use of a portable pump for areas that could not be reached with the larger equipment. The result of the club's campaign was that many acres of good wildlife cover were saved for nesting and protection.

"This is probably the first time a wildlife club took on a job of this kind in Wyoming." Vice President Harry Sprague of the club explained. "Our work saved a large acreage of good nesting cover. But perhaps even more important was the greater consciousness of everyone in wildlife conservation."

Interest in the work spread throughout the community. The club membership jumped to 352 members. Other projects the club has under way include: (1) Sponsoring a series of talks by Louis Moos, Soil Conservation Service biologist, before service clubs, schools, and other groups; (2) Awarding \$100 each year to a farmer making a worthy contribution to wildlife; (3) Urging passage of a State law to insure each purchaser of a hunting or fishing license for \$10,000 against public liability or property damage while hunting or fishing; and, (4) Distributing hundreds of bulletins and leaflets from the Game and Fish Commission and the Soil Conservation Service to persons interested in the conservation of wildlife in the area.

ROBERT E. VORE, who has a combination livestock and small grain farm near Beulah, Wyo., has served as a supervisor of the Redwater Soil Conservation District for the past 10 years.

Bob became interested in the workings of a soil conservation district back in 1947, after going to county information meetings conducted by the county agent. The county agent was telling the folks in the county that conservation could be speeded up and a more complete job accomplished through a district. After some discussion and reading, Bob decided that he and the folks in his neighborhood could use a soil conservation district, and he set out to help get one organized.

"The going was pretty rough for awhile because most folks didn't know what it was all about," Bob said. "Most everyone was interested in conservation, but were leary of the new-fangled idea called a 'district'."

Bob's patience and the respect with which he is held in the area began to pay off. After many miles of traveling to see his neighbors, names began to appear on a petition calling for a public hearing. The hearing was finally held, and the State Soil Conservation Committee approved a referendum. Before the referendum, Bob was again busy explaining the advantages of a district to everyone he could find. He covered every road in eastern Crook County and talked to all potential voters.

With a reminiscent smile, Bob tells of the success of the referendum, and the beginning of a new era for Crook County agriculture. He was one of the first to develop a plan of conservation operations for his ranch, based on land capability. Anyone driving by his ranch today immediately sees what complete conservation can mean to a farm or ranch. All of his small grain is on the contour. Diversion ditches at the head of his fields control runoff, and his grazing land is being managed to permit maximum use while holding his pastures in good

Note:—The author is area conservationist, Soil Conservation Service, Gillette, Wyo.

condition. His hay meadows are always well kept and are producing adequate feed for his livestock operations of fine Hereford cattle.

Visiting Bob on his ranch is an experience to remember. His enthusiasm and sincerity, along with his accomplishments, will make anyone realize that he is interested in the care of the land for the future. Bob has a good reason for looking into the future, too! He and Mrs. Vore are raising five children from this land he is caring for. Four of the children are boys who might also be dependant upon the land for a living someday. The older boys are a big help to Bob, and they certainly have an advantage in growing up and learning on a conservation farm.

At one time the ranch was not bristling with conservation as it is today. Yet, even before the district was organized, Bob recognized that something had to be done if he was to raise his family on this farm. His "red bed" soil was productive but was also highly susceptible to erosion. Too much of his topsoil was being lost through hard rains, and the county road was beginning to choke with silt from his land.

Vore borrowed an engineer's level and began to go to work on his own. The first year he and his hired man laid out contour guide lines on 150 acres. Later he received help through the local PMA office and completed 210 acres of

contour guide lines before the Redwater Soil Conservation District was organized. He had many problems in making the switch from "block farming" to contour farming, but his perseverance has paid handsome dividends—his soil loss is held to a minimum, and the yield increase is most gratifying. Today, contour farming, terraces, diversions, and the like are commonplace in most of the district.

In 1948, Bob was appointed as one of the supervisors of the Redwater SCD for 1 year. Since then he has been reelected three times for 3 year terms. As 1957 came to a close, he had served 10 consecutive years.

Many interesting things occurred in those 10 years. Bob relates that it took some doing to arouse the interest of the people. Many meetings were attended, many miles traveled for several years before the folks began to show genuine interest. Bob became discouraged for awhile because many times not enough of the board members appeared for a quorum; or even worse, he would be the only member present. The general apathy of the people was enough to discourage most anyone, but Bob kept going.

It wasn't as though he had nothing else to do. Bob was also serving on many other boards in the county, including, county fair board, Farm Bureau, school board, and welfare board. He continues to give his time as freely today as 10 years ago. He is president of Crook County Farm Bureau, is still on the welfare board, and recently agreed to serve on the newly organized weed and pest control board.

He points with pride at the way the people are now supporting the Redwater SCD. Businessmen too are supporting the district movement, including active support of the Sundance Bank, Sundance Times, and equipment dealers in Sundance, as well as businessmen in Belle Fourche and Spearfish, S. Dak.

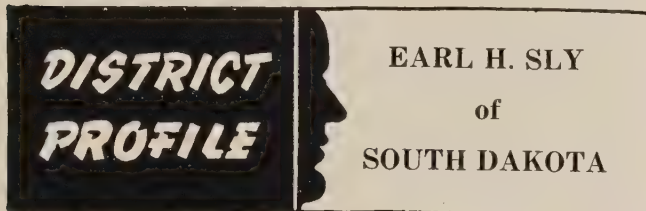
After 10 years of service on the board of supervisors, Bob decided that it was time for "new blood" to take the helm. He knows the district is enjoying the greatest support it has ever had, and he can leave the board with the satisfaction that his efforts, as well as many others, have not been in vain. After attending over 120 meetings, and traveling well over 6,000 miles, many of which were in subzero



Bob Vore displaying a certificate won for being the outstanding conservation farmer in the Redwater Soil Conservation District.

weather, mud, or snow, Bob is entitled to a well-earned rest.

Because all the expenses involved came out of Bob's own pocket, he was asked if he cared to estimate the amount of money he had contributed during the 10 years. Of course, he declined to say, but commented: "It was little enough, as a man's responsibility to the soil. I can now sleep nights through a hard rain-storm with a feeling of security, knowing when I wake up that my farm is still here for my boys. It is gratifying also, to drive over the same roads I travelled in 1948 and see conservation shining on almost every farm. Whatever money I spent these past 10 years has been repaid many times in the satisfaction of knowing that most folks in the district also believe in the future of our county's agricultural resources."



"THIS so-called level land needs soil conservation practices too," said Earl H. Sly as he looked out across the stretch of land west of his farmstead that appears to run level clear to the horizon. "When we get more moisture than the soil can absorb, it has to go some place; and, before we put in that diversion terrace, it all seemed to run this way where it was beginning to cut a gully. The water accumulates way the other side of my west boundary which is a half mile from here—and it all drains this way."

Earl and an SCS technician figured out a diversion terrace and constructed it so as to catch the foreign drainage near his west boundary. The diversion terrace then spreads this water, part to the south and part to the north, as it flows slowly around the ends of the terrace and back to its channel.

This is only one of the many soil conservation practices Mr. Sly has on his farm near Platte, S. Dak. He has lived in Charles Mix County all of his life. He and his wife have lived on the home place for 39 years.

The entire family is conservation-minded. Mrs. Sly keeps currently posted by reading every article on conservation that comes to their house and also enjoys entering into discussions about the merits of various soil conservation practices. Earl appreciates that the soil on his farm, and in his township generally, has some limiting factors; perhaps more than most of the land in the other parts of the county. But he has long since become reconciled to live with it and treat the land according to its capabilities.

The first notable conservation practice used on the Sly farm was the tree planting he started soon after he acquired the farm. The first planting has been added to several times until the farmstead and each of four feed lots are nearly surrounded by trees. In addition, there is a 5-acre planting across the road east of the farmstead.

There are 160 acres on the home place. While the floodwaters created by the foreign drainage are now diverted away from the main field, it is planted on the contour to prevent runoff from the field itself. "We try to save every drop of rainwater that falls on the place," Earl states. "We can also 'plug' the terrace if we want to use the floodwaters for flood irrigation. We can then force the water across the terrace just about any place we choose. However, this practice is practical only when the field is in



Mr. and Mrs. Earl Sly holding one of their conservation award certificates.

grass. It would probably start a gully if it didn't have the grass to tie the soil down."

Earl periodically rotates his cropland with grass and legumes and feels that it pays dividends both in immediate returns and by benefits to the soil. He says, "It helps improve soil structure so that it can hold more moisture as well as giving it additional plant food. Our soil gets 'tight' pretty fast after we crop it a few years, and we've got to watch it or soon it won't absorb much water at all below the surface."

Mr. Sly has participated in the TVA fertilizer experiments in cooperation with the Extension Service. He worked closely with the county agent and with Extension soil conservationists, in applying the fertilizer in measured amounts and harvesting the samples to determine the fertilizer benefits. Of these experiments, he has this to say, "We learned that we need to add phosphorous, too, as well as nitrogen and organic matter to our soils." Sly is a charter member of the Charles Mix County Crop Improvement Association and has served as president of this group for 7 years. Numerous grain test plots have been planted on the Sly farm, and he readily volunteers for any such worthwhile project to help make good farming even better.

The half-section across the road has need for more conservation practices than the home place, and Earl has used them there. One hundred and sixty acres of this, which has a sizable acreage classified by the Soil Conservation Service as Class IV land, has remained in native grass for pasture and hayland. Sly has divided it into 4 equal 40-acre tracts for a rotation system. He pastures each 40-acre tract 1 year and uses it for hay the following year. This system makes it possible for each species of grass to live its normal life span at least 1 year out of every 2 years, and for all the grasses to remain pretty much in their original composition.

Earl says, "We attempt to follow the 'full-use' system and to wind up the grazing season by taking half and leaving half the grass."

This division of pastures created a water problem that was solved in the course of time by dugouts or dams. The Class IV lowland, which is common to both north pastures, has had a fairly high water table. Dugouts were

made in each of these pastures on the Class IV sites. The other two pastures are served by combination dams and dugouts and a windmill.

The cropland is more rolling on this land across the road than on the home place. There were some gullies developing before Earl learned about the soil conservation practices that would stop them. Now he has put in a terrace and contour stripcropping system that effectively controls the erosion. Another first in the county on the Sly farm is a fence built on top of a terrace to make a field boundary. "This fence built on top of the terrace eliminates the short rows that would exist between the terrace and a straight fence," Earl says.

Recognition has come frequently to the Slys down through the years, not only for their achievements in soil conservation, but in other pursuits of farming as well. In addition to winning many crop show prizes, the family received the WNAX radio station award for "Home Improvement" in 1949. Earl has won the State Soil Conservation Award, and he was a member of the soil conservation team that won the Sioux City Soil Conservation Award in 1950. Just recently, he attended a short course at Iowa State College at Ames, Iowa, where he was a guest of the Mississippi Valley association to represent South Dakota at that event.

The Slys are taking it a little easier in the semiretirement years of their life. The sons do the farming, but Earl still keeps close supervision on all the farming activities, including soil conservation.

From observations made during their travels, from many experiences gained on their own farm, and from the knowledge gained at the short courses attended, the Slys are more convinced than ever that soil conservation has an important place on all land—even on level land.

—JAMES P. HUGHES

THE MEANING OF CONSERVATION.—To me, conservation means use—multiple use—use of the product without damage to the capital—use of the land without impairment of its capacity for sustained production—use of the land within its capabilities—treatment of the land to achieve maximum production—use of the land to provide for better living and better homes—enlarging opportunity for those who live on the land and for those who are dependent on them.

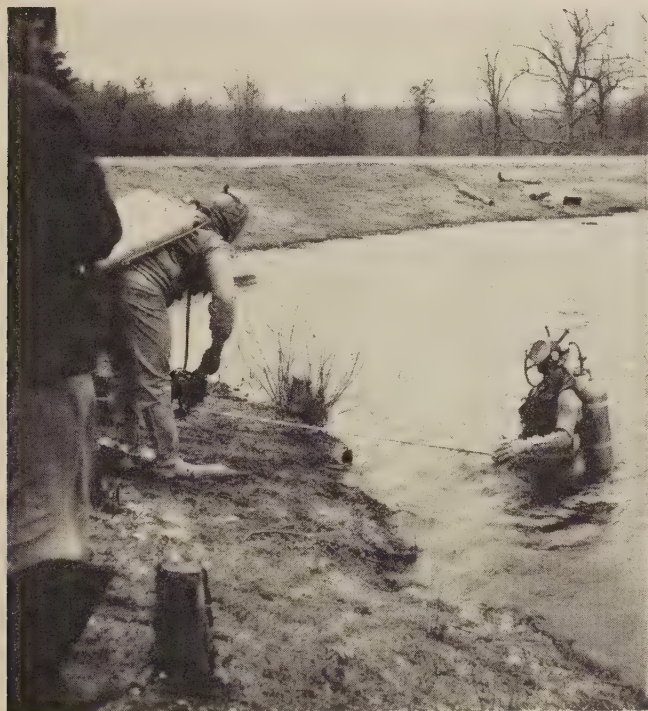
ERVIN L. PETERSON
Assistant Secretary of Agriculture

Operation—Pond Plug

By **ROGER N. LEVESQUE**

NAVY skin divers made a strange spectacle as they submerged into a farm pond in midwinter. Actually, they were playing "Good Samaritan" in an unusual bit of interagency cooperation.

The operation took place on the Carolina Reserve, part of Rhode Island's Fish and Game Division lands. About a year ago the division built a 4-acre pond. Being a cooperator with the Southern Rhode Island Soil Conservation District they received technical help from the Soil Conservation Service.



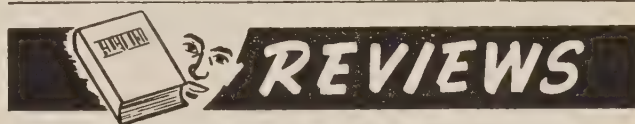
Navy skin-diver ready to submerge and to locate and pull the drain plug of the pond.

The pond was finished late in the fall. Grass was planted on the emergency spillway and the dam, but it did not make enough fall growth to protect the raw earth from winter rains, so the SCS technicians advised leaving the pond empty until spring. The plug on the outlet pipe was left off for the winter.

A hitch in the plan came when the SCS tech-

nicians found the pond full after a rainstorm. Someone had dropped the plug in place. Another rain might send the water over the raw-earth spillway and cause serious washing there and around the dam.

Several attempts at dragging the bottom with an anchor and chain proved futile. A call was put in to the nearby Quonset Point Naval Air Station for skin-diving aid. The Navy O.K.'d the request and sent two men to the scene. Equipped with cold-stopping rubber suits and air-lungs, the men dove for the plug. In no time they had it out of the pipe. After a short swim the divers returned to base—mission accomplished.



THREE WATER BALANCE MAPS OF EASTERN NORTH AMERICA. By C. B. Thornthwaite, John R. Mather, and Douglas B. Carter. 47 pp. Illus. 1958. Washington, D. C.: Resources For the Future, Inc. \$2.

THE need has long been recognized for an accurate method of determining water quantities associated with the hydrologic cycle. Water, as vapor, rises from the oceans, is carried inland by air currents, is precipitated over the land, and is returned to the oceans by streams. This is an oversimplification of the water cycle. With an increasing demand on our water resources, it becomes necessary to inventory these resources and to learn more about the hydrologic cycle; values of precipitation; evapotranspiration; groundwater recharge; and surface water runoff.

The authors of this publication have developed generalized maps covering eastern North America on (1) Mean Annual Potential Evapotranspiration; (2) Mean Annual Water Deficit; and, (3) Mean Annual Water Surplus. The water balance method used by the authors uses data which are relatively easy to obtain. Computations are based on values of precipitation; actual evapotranspiration; potential evapotranspiration; water surplus; soil moisture utilization; water deficit; and, soil moisture recharge.

Note:—The author is conservation aid, Soil Conservation Service, Wakefield, R. I.

CHANGE OF ADDRESS SHOULD INCLUDE ZONE, OLD ADDRESS, AND CODE NUMBER.

The generalized maps have definite technical limitations, as pointed out by the authors, but they should be useful in getting a good picture of the moisture relations over a large geographical area. The publication discusses in clear and simple language the relative importance of computing water balance information on a daily, monthly, average monthly, and average yearly basis.

The approach outlined in this publication could prove to be very useful to water resource planners, water users, conservationists, and others interested in the efficient use of water. Application of local climatic and soils conditions, along with an appropriate time, provides a means whereby water balance information is available to small areas or specific locations.

—W. G. SHANNON

HYDROLOGY FOR ENGINEERS. By Ray K. Linsley, Jr., Max A. Kohler, and Joseph L. H. Paulhus. 340 pp. Illus. 1958. New York: McGraw-Hill Book Co. \$8.

THIS text is written in simple terms to provide the engineering student with a theoretical background in hydrology, and to point out the application of hydrology to engineering problems.

In many respects this text is similar to "Applied Hydrology", 1949, by the same authors. The simplicity of presentation, plus a listing of sources of hydrologic data and typical problems to point out the application of

methods presented, will make it a more valuable text to introduce the student to Hydrology.

Practicing engineers not familiar with recent technical publications in the field of Hydrology will also find some new methods and concepts not previously included in textbooks.

—H. O. OGROSKY

LESS SWEETCLOVER SEED.—The 1958 crop of sweetclover seed was estimated at about 29 million pounds. This is 4 percent less than 1957 and the smallest crop since 1943.

MORE RED CLOVER SEED.—The 1958 crop of red clover seed was estimated as being about 10 percent greater than the 1957 crop. Yet this crop is about 9 percent less than the 1947–56 average.

HOW LONG WILL DRAIN TILE LAST?—John S. Smith, SCS technician in Cherokee County, N. Y., says some tile installed near Geneva, N. Y. in 1835 was still giving good service a few years ago, when he inspected it.

WATERSHED SHORT COURSE.—The Abraham Baldwin Agricultural College at Tifton, Ga. and the SCS jointly sponsored a short course on watershed organization for community leaders in watersheds applying for Federal assistance under Public Law 566. Seventy-seven people registered for the first course.

An aerial photograph of a rural landscape. In the foreground, a small church with a tall steeple is nestled among trees. The middle ground features a large, winding, light-colored area that appears to be a dry riverbed or a large field. The background shows a patchwork of fields and some distant trees.

MAY 1959

Soil Conservation

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION.

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SECRETARY OF AGRICULTURE

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OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

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TOM DALE, Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, June 26, 1958. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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FUTURE NEEDS FOR SOIL AND WATER CONSERVATION.—During the past year the population of the United States passed the 175 million mark. The Census Bureau has raised its estimate for population by 1975 to 244 million. Some experts are predicting that the present population may be doubled by the year 2,000.

Can our land resources be made to feed, clothe, and house twice the present number of people? We believe they can, provided our good agricultural land is used for that purpose and is protected and improved, and our water resources are more efficiently used. Obviously, the future needs for soil and water conservation are tremendous.

—D. A. WILLIAMS, *Administrator,*
Soil Conservation Service

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—A rural church in a conservation farming community of Pepin County Soil Conservation District, Wis.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Modernizing Snow Surveys

Two-way Radios Are Rapidly Being Adopted for Communications Between Snow Survey Parties and Their Base Stations. Electronic Measuring Devices Are Being Considered as Substitutes for Snow Surveyors.

By W. G. SHANNON

SNOW business is big business, especially when you are trying to measure accurately the amount of moisture in all the snow that falls on the mountain ranges of nearly half a continent. Like any other business, snow surveying should keep abreast of modern times. The time is overdue for using the full potential offered by electronics and other modern scientific developments to further the cause of water supply forecasting.

A vast network of snow survey courses exists in the Western States and parts of southwestern Canada. These courses, for the most part, are located in high mountain areas where snowfall is abundant.

The Soil Conservation Service, with many agencies and organizations cooperating, provides the leadership in obtaining snow survey and soil moisture information from the mountains. This information is used in preparing forecasts of probable water supplies during the snowmelt-runoff period.

The increasing demand for advance information on potential water supplies requires a greater use of recent scientific developments and procedures to keep pace with the demand.

Falling snow doesn't mean much for forecasting purposes unless it is known where it falls and how much falls. The snow surveyor obtains this information. Most people have experienced the hazards involved in driving on icy or snow-covered roads. It is not too difficult to visualize what travel may be like for the snow surveyor in the rugged western mountains in midwinter. The volume of information that can be economically obtained under these

conditions by direct measurement of snow by surveyors is limited.

The snow surveyor has several modes of travel—on ski or snowshoes, in automobiles, over-snow machines, or by airplane. The mode of travel is set by the location of the snow course; and the location, in turn, depends on the need for representative snow information from a particular area.

To meet the challenge of the mountains, it has been necessary to provide the best of training to people making snow measurements. Training schools are regularly scheduled for this purpose. Snow surveyors receive instruction in mountain survival, safety and health,



Snow surveyors assemble their equipment to take snow samples and measure the water content.

Note:—The author is a civil engineer, Soil Conservation Service, Washington, D. C.

use of skis and snowshoes, operation of over-snow machines, and survey methods and procedures for sampling snow.

The use of airplanes is by contract with commercial firms. To date, the use of airplanes has not been very successful. Landing in the snow is hazardous, and reading snow depths from the air does not provide an accurate estimate of the water content of the snow.

In some places the snow courses are located adjacent to improved roads and can be reached by car. But these are exceptions and not the rule. Over the years, various kinds of over-snow machines have been developed. Most have proven inadequate for mountain travel. A few types are being used today for over-snow travel in the mountain areas. Even with the best of these, the snow surveyors are confronted with frequent breakdowns, often miles from the nearest help. Under these condition, they either make their own repairs or travel "out" on snowshoes or skis.

The foregoing discussion points up the need

for two things: (1) a simpler and less hazardous means of making snow surveys; and, (2) a reliable means for the snow surveyor to maintain communication contact with a base station.

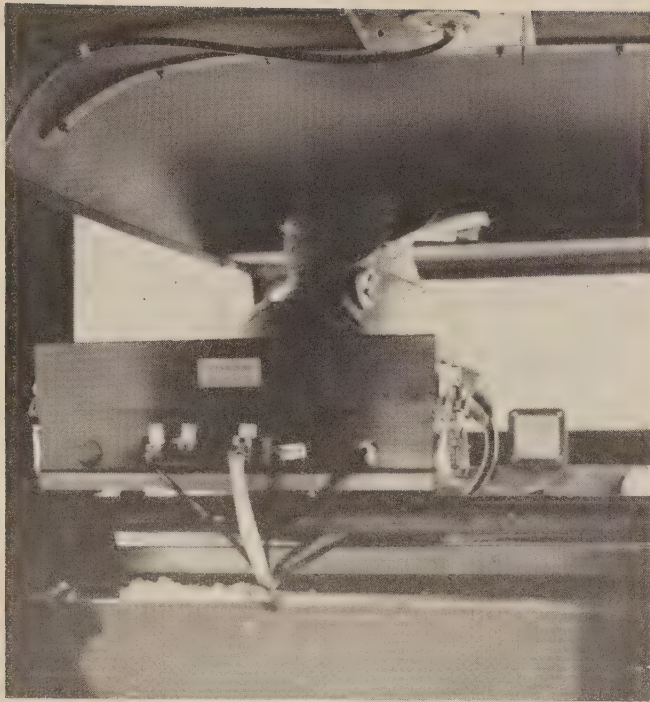
Considerable effort is being put into an economical and practical solution of this first problem. This involves using electronic devices for the measurement of water equivalent and other data at remote mountain locations and the transmission of these data to a base receiving and recording station. It will probably be some time, however, before simple and economical equipment can be developed that will meet these requirements.

Steps have already been taken to overcome the second problem. Commercial two-way radio communication equipment is available, which will work satisfactorily under snow survey conditions. However, there are many problems associated with its use.

The Interdepartment Radio Advisory Committee has established rules and regulations for the use of frequencies and radio communication



Over-snow machine equipped with two-way radiotelephone.



Radiotelephone equipment in an over-snow machine. The equipment is so installed that it is clear of gas-tank, passengers, and antenna.

equipment by Federal agencies. These rules and regulations, in general, follow those prescribed by the Federal Communications Commission.

Establishing two-way radio communication for use in Soil Conservation Service over-snow machines requires approval for an operating frequency; location or area of operation; type of emission; call sign; and maximum power. Frequencies may be assigned in the low frequency band, high and very high frequency bands, and in the ultrahigh frequency band. Each of these bands has different characteristics which must be considered when establishing two-way radio communication. In general, it is difficult to communicate out of deep mountain valleys or ravines without the use of relay stations installed on mountain knobs or peaks.

In the mountain States, numerous networks employing relay stations have been established by various agencies. The Soil Conservation Service has been fortunate in being able to tie into some of these existing systems. In Arizona our operators are able to keep in radio contact with the law enforcement agencies' network. In Nevada, they operate with the State forestry radio network. The U. S. Forest Service has been

most cooperative in allowing a "tie-in" with some of their forest networks. This arrangement is working in Idaho, Montana, and Utah. Then there are areas requiring separate base and mobile stations operating independently of any existing network.

Radio communication equipment is being installed in over-snow machines and at other specified locations to: (1) provide current information on the location and progress of over-snow machines and condition of personnel; (2) expedite repairs to machines enroute to or from snow courses; (3) transmit snow course information faster; and, (4) provide a means of obtaining snow course data from ranchers or others located in remote areas, thereby eliminating the need for a trip to the snow course from the "outside."

The McCauley ranch in the Black Mountains in New Mexico is one such location. The nearest post office is about 70 miles away and must be reached over a treacherous mountain road impassable in bad weather. Only a jeep can maneuver parts of the road without damage even in good weather. Inhabitants in the area are few and far between. Travel into the snow course area with an over-snow machine would be long and costly. At times the rancher could measure the snow courses but could not get the information to the nearest post office at the



Snow surveyor (Richard Funke) calls the nearest relay station to report the results of his survey and say that all is well.

town of Truth or Consequences. The installation of a two-way radio set solved this problem. The information is now transmitted to a forest ranger station, which relays the information by radio to Silver City, N. Mex.

There are many situations where the two-way radio equipment will provide benefits, aside from its emergency uses in case of accident or danger to life. One such situation developed in the rough mountain area of Idaho. Some exceptionally long trips are required by over-snow machines to obtain information on snow cover conditions in this State. On one of these trips one track of the over-snow machine broke under strain. Normally, under these conditions, the snow surveyor and his companion would have to strap on snowshoes or skis and a back pack

and travel out of the mountains on foot over the snow. There is always the possibility of avalanches, accidents, or other trail hazards involved while traveling under these conditions. Fortunately a two-way radio set, which had been installed in the machine a few weeks before, was used to contact the base station and to advise them of the trouble. A new track was dropped by airplane nearby. Repairs were made and the survey was successfully completed.

Electronics has been used to provide the solution to many problems in many fields. In the field of snow surveys, there is little question that electronics can be used to obtain more information at a more economical cost. Along with this, it should make the lot of the snow surveyor a little easier.

RED CLOVER—THE OLD RELIABLE

By E. A. HOLLOWELL

No. 45

This is the forty-fifth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

RED clover, the legume of many uses for many places, is still one of the best. After more than 250 years of use, it holds a firm position in good farming in the humid northern sections of the U. S. for hay, pasture, silage, and soil improvement. In the South and West its use is increasing. Its prestige has been enhanced by recent improved varieties.

There are good reasons for red clover's continued and extensive use. Pasture-renovation tests and farm experiences have shown that

under cool humid conditions it surpasses all other legumes in the rapid, consistent establishments of good productive stands under wide extremes of soil conditions and fertilizer treatments. It develops good stands when seeded with different companion crops and in mixtures with other legumes.

Red clover has many deficiencies, the most serious being its failure to withstand long summer droughts and its tendency to succumb to repeated periods of freezing and thawing during early spring.

Red clover is a perennial plant that may behave as a winter annual or a biennial. Diseases, insect pests, unfavorable weather, and improper management, alone or in combination, may lead to its premature death. New varieties, resistant to diseases and insect pests and tolerant to unfavorable weather, should reduce farm losses. However, new varieties will not make satisfactory crops without proper nutrition, management, and culture. All these requirements must be met to obtain the potential value of red clover.

Note:—The author is head, clover section, crops research division, Agricultural Research Service, Beltsville, Md.

It is surprising how red clover will respond to good treatment. While it will grow in slightly acid to medium acid soils, it benefits from the use of limestone. Phosphate and potash are two important fertilizers that red clover must have to make good growth. Fertilizers having ratios of 0-1-2 and 0-1-3 are giving greater red clover yields on many soils where, in the past, an 0-1-1 mixture was thought to be adequate. An increase in the rate of fertilizer often results in greater yields.

Fertilizer residuals from application on winter wheat in the fall, may not be enough for good growth of spring-seeded red clover on the same field. Many farmers apply additional fertilizer, especially phosphate and potash, in late winter or early spring.

Another extremely important factor in getting good, persistent stands is date of seeding. Seedlings made in late February or the first 2 weeks in March have given far better stands that persist during hot, dry periods of the summer than later seedlings.

The summer of 1957 was the driest on record for the Eastern Shore of Maryland. Much of

the corn failed to produce more than small nubbins. A stand of Chesapeake red clover seeded in late February on winter wheat survived the summer drought even with the competition of a 30-bushels-per-acre wheat crop. While the Chesapeake variety may have some drought-resistant characteristics, the early establishment of the stand and good growth during the cool months of spring favored plant survival during the long, hot dry summer.

Basic research on the effect of different temperatures on growth and survival of red clover has shown that high temperatures favor the depletion of root reserves, leading to seedling starvation. Date-of-seeding tests have also shown the value of early seeding in getting and maintaining good stands.

In the deep South more red clover is being used every year. There, it behaves as a winter annual. It is planted from October 15 to December 1, the date depending on location. If red clover is planted in a perennial grass turf, the grass should be closely grazed or clipped and fertilized. Many farmers are effectively using sod seeders which open up the turf, a



On experimental plots near Beltsville, Md., the Kenland variety of red clover proves to be superior to Cumberland.

condition that favors the seedling establishment.

In the deep South red clover will produce an abundance of grazing and can be used for hay or silage before the stand dies during the middle of the summer. It should not be grazed as closely as whiteclover or Persian clover. Rotation grazing is more desirable than continuous grazing. If one of the southern varieties, such as Nolin or Port Gibson, is used, and if it is allowed to set seed, a good volunteer stand can be obtained.

While red clover has been widely used in the Rocky intermountain region under irrigation, particularly for seed production, its potential for forage has not been realized because irrigation has been improper. The same situation exists in the area along the Pacific Coast. Irrigation practices for alfalfa have generally been followed. For yields ranging from 5 to 7 tons per acre, red clover requires more frequent irrigation with a smaller quantity of water. However, the total water requirement of red clover is about the same as that of alfalfa.

Diseases play an important role in yields, in stand persistency, and in hay quality. All parts of the plant are subject to diseases. Diseases fluctuate in occurrence and intensity with weather conditions that affect the development of the disease-producing organisms and with the susceptibility of the host.



Typical symptoms of the northern anthracnose disease on leaf and flower stems of red clover.

The fact that red clover has been a major legume for such a long time attests its virtues in spite of its susceptibility to disease and insects. Breeding for disease resistance is the best method of control. Basic research on the organisms causing diseases is essential before a good job of breeding for disease resistance is possible. After the organism has been studied, the next step is the development of screening procedures by which literally thousands of plants are subjected to inoculation under conditions favorable to development of the disease or diseases. The plants that show some resistance are selected and intercrossed, and their progeny inoculated in turn. It is generally necessary to repeat this procedure for many generations before a high degree of resistance is obtained while other desired characteristics are maintained. The Kenland variety has high resistance to southern anthracnose, while Dollard is highly resistant to northern anthracnose. Two new experimental varieties, as yet unnamed, are highly resistant to powdery mildew, and one of them is resistant to northern anthracnose. Resistance to other diseases is being studied as rapidly as facilities permit.

There are two particularly destructive insects that shorten the life of red clover. These are the red clover root borer and the clover root curculio. There are no varieties resistant to either of these insects, which take their toll unless controlled by the use of insecticides.

Pennscott, Dollard, Kenland, Chesapeake, Nolin, and Port Gibson, are red clover varieties that have been widely tested by State agricultural experiment stations. One or more of these have been found to be best adapted to specific States or parts of States and are being recommended over common red clover.

For better red clover: (1) use the variety recommended by your State agricultural experiment station; (2) follow the recommended liming and fertilization practices; (3) in the North seed early in the spring, and in the lower South seed in the fall; (4) clip and remove grain stubble and weeds during the summer; and, (5) treat stands with insecticides to control insects. Good red clover responds to good treatment.

Stone Wall Removal Pays

By LESTER FOX

FROM the rockbound coast of Maine to the gentle hills of New Jersey, farmers are busy removing stone walls from their farms. Romantic relics of a bygone era, the stone walls stand in the way of modern farming. Farmers who have removed their stone walls report these benefits:

(1) Acreage gain. For every 1,000 feet of stone wall removed, they gain about an acre of land worth \$200 to \$500.

(2) Conservation made possible. With the stone walls removed, they can put in conservation measures not possible with the farm cut up into small fields. Some of these measures, like contour strips and diversion terraces, stop soil loss and conserve water.

(3) Increased production. The larger fields permit better all-round farming. That adds up to larger per-acre yields.

(4) Cheaper and better use of power equipment. Less turning and maneuvering. No up and down hauling—mostly on the level.

(5) Elimination of soil sapping growth of brush and trees in the stone walls.

It costs about \$200 to remove 1,000 feet of stone wall. The ACP helps pay the cost. The farmer usually contracts the job. Several well-equipped contractors do farmwork almost exclusively. The work is laid out, including a conservation plan, by Soil Conservation Service technicians after the farmer signs an agreement with his soil conservation district to carry out the plan.

Most of the stone walls are so old they have broadened as they have crumbled. So they take up more space than when first built. Besides, trees and brush have grown up in nearly all of them. So they are sometimes called "hedgerows" or "stonerows." The trees and brush take needed water from the farmer's crops, and they shade the land along the wall. So, they further cut down on the farmer's production.

Lots of northeast farmers have not yet got around to removing their stone walls. But many of them have, and most of those who have are now all-out for stone-wall removal.

Take Oscar Unangst, young dairy farmer in the Warren County Soil Conservation District near Belvidere, N. J. He had 110 acres that stone walls split into 9 fields. Two of them were 4-acre fields shaped like triangles—hard to work. Many walls ran up and down the slope. The rain raced down the fields along the walls. The racing water gullied the fields. It spilled over into his farm road, keeping it in bad condition. Unangst couldn't put in any erosion-control measures because the fields were too chopped up.

Four years ago Unangst started taking the stone walls out. He has picked up 9 acres of productive land. He has only two fields now. When he pulls out the last stone wall, he will gain three more acres and have only one field.

With the stone walls gone, Unangst was able to start work on a soil and water conservation plan. He has put his land in contour strips. The



Stone walls cut this New Hampshire farm into many hard-to-work fields.

Note:—The author is information specialist, Soil Conservation Service, Upper Darby, Pa.



Oscar Unangst looks over a pile of stones that once divided his farm into nine small fields.

rain now soaks into the soil where the plants can use it. The gullies are gone. His fertilizers no longer wash out with the soil. Crops are doing better, and quantity and quality are both up.

"I hope I'm not exaggerating, but I honestly expect a 200 percent increase in production," Unangst said.

"We're fertilizing a little heavier than we used to. We can afford to now because we're getting full value from it. It isn't being washed away anymore.

"Before, we couldn't crop much of the upland. We just let the cattle run in there and get what they could out of it."

"Production? We're now averaging twenty 10-gallon cans of milk a day year-round," Unangst said. "We used to average 13 or 14. We've been improving our herd and that accounts for some of the gain. But my new way of farming accounts for most of it.

"The way it used to be, in the spring when the pasture was good, milk production was good. But along in July and August and part of Sep-



Verne Clifford (left), his son Frank, and Donald K. Wolff SCS technician look over the contour stripped field that was made possible by removal of stone walls that once cut the expanse into many small fields.

tember, when the pasture wasn't so good and we had no silage, the cows didn't do so well. Now in those months, we have green chop and silage. All of our excess green goes into the silo. In fact, we have green feed the year around.

"As far as our contour strips go, I would never change. Each year since I put them in they've been doing better. The soil is working up better and production is still improving."

Verne Clifford is another northwest New Jersey farmer who has become a convert. With his son Frank he owns a 112-acre dairy farm near Delaware, N. J. When he finally decided in 1955 to clear his farm of stone walls, he wasn't sure it was the right thing to do. Now he says he's sorry he didn't start sooner. "I'd be way ahead if I had," he said.

Take the case of George E. Brown, East Corinth, Maine. He operates a 280-acre dairy farm. He had 30 acres that stone walls cut up into 8 small fields. His sloping land of Thorndike silt loam soil was eroding. The small fields hindered his operations. He could not put in the strips he needed to stop erosion. He was equipped with power machinery but his fields were laid out for horse and buggy days.

So Brown removed the stone walls. He gained 7 acres. Now he has one large field instead of eight little ones. He has been able to put in strips of corn, grain, and hay. The strips help control erosion. No more topsoil going down the drain. And, now he can operate his power equipment at less cost with greater efficiency.

Philip Worthen of Exeter, Maine, gave his farm a facelifting by removing 2,100 feet of stone wall. He made three fields into one and picked up 2 acres.

With the farm set up for conservation farming, Worthen handles his operations more efficiently and economically. He doesn't have to worry now about his Bangor and Thorndike silt loam soils eroding.

Herbert Smith of Lincoln, Maine, is a potato farmer. His farm consisted of 8 fields with 96 acres of tillable land. The fields were separated by 5,100 feet of stone wall. The farm was located on a hillside. Its soil is Bangor silt loam, Penobscot County's best potato soil. Soil erosion was taking its toll. It was hard to control in the small fields.



Grown up in weeds and brush, this stone wall occupies valuable acreage on a Maine potato farm. It also prevents the use of proper conservation measures that might stop the runoff and erosion.

Smith removed the stone walls, built 7,300 feet of diversion ditches and put in contour strips. He gained 6 acres. He rotates potatoes with a winter rye cover crop, grain, and hay. All fields operate from a centrally located farm road. Crop rows are much longer, more economical and efficient to operate. Crop yields are on the increase.

Smith is now one of Penobscot County Soil Conservation District's outstanding conservation farmers. His conservation work won him an all-expense 10-day vacation at the Goodyear ranch, Litchfield Park, Ariz.

TWENTY-NINE YEARS OF FRIENDSHIP.—

For 29 years farmers of New Haven County, Conn., and members of the Wallingford Rod and Gun Club have been friends. Now both are benefiting from that friendship, and they expect the benefits to increase as farmland affording hunting and fishing decreases and the need of encouraging wildlife on the remaining farmland increases.

In 1930, founders of the rod and gun club invited the county's farmers to a dinner as a friendly gesture. Every year since then the club has been dinner host to the farmers. Nowadays the dinner is held in March at the Wallingford Grange Hall. Fish and game officials, the featured speakers, keep both the farmers and the

sportsmen informed on wildlife matters. They usually have something helpful to say about farmer-sportsman relations. Most of the farmers attending now are cooperators with the New Haven County Soil Conservation District.

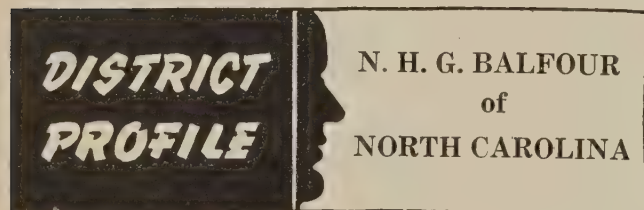
"We didn't have this in mind but our friendly relations with farmers have helped our club members a lot," said Julius Toth, former president. "Our farmer friends don't hesitate in opening their land for the use of our hunters and fishermen. They know from our friendship that they can depend on our club members to use good outdoor manners and to respect their privacy and property. In these days, when places to hunt and fish are getting scarcer all the time, our club appreciates the friendship of our farmers all the more."

The farmers also help the club members by including wildlife-encouraging measures in their soil and water conservation plans. The club furnishes farmers with bicolor lespedeza and evergreens for wildlife plantings. Members help farmers plan wildlife areas. The club also stocks birds on the farms.

As a district cooperator, the club itself practices soil and water conservation on the 3,000 acres it owns.

"We're all working together, doing our best to conserve our wildlife resources," Toth said.

—THEODORE W. PAWLOWSKI



IN the year 1884, a young civil engineer just out of Edinburgh University left his native Scotland for Westport, New Zealand. George Goldie Balfour and his young wife had high hopes as they landed in this remote part of the British Empire. He had been commissioned to build the harbor works in this fast-growing seaport town. They established a home and settled down. Napier Humphrey Goldie Balfour was born in 1890. He was later to become one of the outstanding soil conservation district supervisors in North Carolina.



N. H. G. Balfour.

When young Napier was 6 years old his father and mother decided to go back to Edinburgh where the children could get an education. George Goldie Balfour had long been close to Edinburgh University. His father, John Hutton Balfour, had been a professor of Botany there. Also a brother, Isaac Bayley, who later became Sir Isaac Bayley Balfour was a professor of Botany. This uncle of young Napier was later named King's Botanist to Scotland and Keeper of the Edinburgh Botannical Gardens.

Young Napier Balfour attended Rutherford College at Newcastle-On-The-Tyne. About this time T. K. Brunner, the commissioner of agriculture for North Carolina, made a trip to Scotland to see his old friend Edward Bayley Balfour, a great-uncle of Napier. He told of the agricultural possibilities in North Carolina and persuaded young Balfour and several other Scottish lads to emigrate to America.

Napier left Scotland at the age of 17 to come to North Carolina. He found work on a truck farm near Lumber Bridge for \$10 a month and board. He worked there for 18 months and then went to Wisconsin where he worked on a

farm and attended the University at Madison for 1 year.

He later spent some time in Michigan. But he still recalled the warm southern climate and returned to the South in 1917. Soon, he was drafted into the U. S. Army and after brief training was sent overseas. He took part in several major engagements, served with the Army of Occupation on the Rhine, and was discharged with a sergeant's rating.

Upon his return to North Carolina he worked for awhile with Prof. Earl Hostetler, head of the animal industry department at N. C. State College. But many generations of Balfours had worked close to the soil and he was no exception. So, again he came to Lumber Bridge. This time he purchased a part of the Malloy Brothers farm.

In 1931 he married Victoria May Greenfield, who worked as a governess for the British legate in Washington. Mrs. Balfour, although born and reared near London, quickly became accustomed to life on the Hoke County farm. During the depression years the struggle was hard to keep the farm going. Gradually, however, this couple added to the original land until today they have 525 acres, of which 374 is in cultivation and pasture. Incidentally, the farm is named Inverleith after the ancestral home, Inverleith House in Edinburgh.

In 1942, when there was talk of organizing the Pee Dee-Cape Fear Soil Conservation District, Mr. Balfour was one of the leaders. Soon after the district started operations he was elected supervisor and has served continuously for over 15 years. Last year he was elected chairman and has been very active in the formation of a watershed project along the Lumber River.

Like his illustrious second cousin, Lord Arthur J. Balfour, British Prime Minister, 1902-1905, Mr. Balfour has been interested in politics. He has served as Hoke County commissioner for 25 years—10 years as chairman. In 1942, he was elected president of the North Carolina association of county commissioners and served for a 1-year term.

Three years ago he decided that he had served his county long enough as a commissioner and declined to run again. He has turned the operation of the farm over to his son, John, and now he and Mrs. Balfour have time to do some of the things they have always wanted to do.

One of these is a trip to London and Edinburgh. He is still vitally interested in soil and water conservation and wants to continue to serve as a district supervisor as long as he is able.

The 3.2-acre tobacco allotment on the Inverleith farm was placed in the Soil Bank last year and today only general crops such as corn, small grain, cotton, and soybeans are grown. The largest acreage is planted to corn. A herd of approximately 125 Aberdeen-Angus cattle is kept the year around. Mrs. Balfour has always insisted on having a few sheep on the farm so this is one North Carolina farm on which sheep can be seen grazing the green pastures. A comparatively new venture is 1,500 laying hens.

—W. O. LAMBETH

Great Plains Program Aids Small Rancher

By H. G. HILPMANN

"IT looks good to me. How soon can I get started?" That was Fred Walker's reaction after the Soil Conservation Service staff member explained how the Great Plains Conservation Program (Public Law 1021) would help with his ranching problems. Walker's statement is in contrast to that made by some who have thought the Great Plains Conservation Program would be of little benefit to small operators. His ranch unit is small by comparison with some other layouts in the area.

Walker's "spread" is about 8 miles north of Fort Laramie in Goshen County, Wyo. The practices involved in a soil and water conservation plan were not new to Fred Walker. His father, Dwight, had developed such a plan back in 1947 as a cooperator with the Lingle-Fort Laramie Soil Conservation District. That plan called for seeding of rangeland, building stock water dams, installing a water-spreading system, and planting a windbreak. Various factors, such as drouth, severe winters, storms,

Note:—The author is soil conservationist, Soil Conservation Service, Torrington, Wyo.

wind, and fluctuating markets had slowed the conservation job. And, there was the matter of expense, too.

When Fred took over the ranch after the passing of his father, there was still a lot to be done. Since the ranch is small, it is used primarily to winter cattle. Fred saw the need for better winter grazing. Range condition varied from good to poor. The windmill near the ranchhouse didn't furnish adequate water for cattle in the pastures. There was another item: Cattle need hay in winter, and the ranch was producing no hay at all.

There were some problems all right. But Fred could see that the provisions of the Great Plains Conservation Program were geared to minimize them. His application to participate in the program was the fifth in the Lingle-Fort Laramie district.

As any other Wyoming cattleman, Fred knows grass is the best productive cover he can

have on his land, and erosion won't take place under good grass cover. About 200 acres on the ranch were dryfarmed when he was a boy. This land was later seeded to crested wheatgrass. The grass is now very sparse, and is dominated by sand dropseed and curlycup gumweed, not a very desirable combination from the forage standpoint.

Fred's Great Plains conservation plan, which he developed with SCS technicians' help, brings the original conservation program up to date. It will enable him to reseed about 180 acres of this land to native grasses. When established, the new grass will give more and better winter grazing, and relieve the "pressure" on the balance of his grazing land.

A dam, intended for water spreading in one of the pastures, was built 15 or 20 years ago. It failed, due to improper design. Investigation by SCS technicians showed reconstruction to be impractical. It was found that a system of spreader dikes and ditches would require less work and would control two to three times as much water as the former dam. Twenty-five to thirty acres of hayland will be developed with the benefit of the spreader system.

Fred is a good road-grader operator, a job that he handles part time for the school district. In his part of the country, the school district helps maintain roads traveled by the school buses. He figures he will be able to negotiate with the district to use the grader to do part of the dike and ditch construction himself.

The large north pasture will be fenced to divide it for better grazing management, and a stock-water dam will be built in the east half. A well and storage facility will furnish stock water in the west half.

A farmstead windbreak is essential for most people in these parts. Fred's place doesn't have one—as yet. But with provision in the Great Plains Conservation Program for helping a man establish trees, Fred says this is a bet he won't pass over. He will put in a 2-acre L-shaped windbreak around his ranch headquarters.

Developing a conservation plan for the ranch was a relatively easy job. Fred knew what the place needed, and where he wanted to start. In fact, SCS technicians advised him to at least hold off until his contract was approved and signed before he started work.



Fred Walker prepares to mount the grader used in constructing spreader dikes and ditches.

The amount of his own money involved in the 5-year plan is small in relation to the conservation that will be applied. His main contributions will be his own labor and good grazing management of the entire ranch. The cost shares to be paid by the Federal Government will amount to 80 percent of the county average cost of installing such practices as reseeding and water spreading.

Fred commented, "I like it because the cost sharing is set up for the whole 5-year period. I can run my cows on that grass too, after it's

established." He also knows that he can proceed with his plan ahead of schedule if he's able, and he can receive the cost share as soon as each practice is satisfactorily completed.

The Walker Ranch is in the 25,000-acre Pine Ridge-Case Bier watershed, in Goshen County, which is receiving Federal assistance for flood prevention. Fred is carrying out a job of protecting and improving soil and water resources—his own land and the watershed—through a Great Plains program for both the small and large operator.



4-H CONSERVATION AWARD WINNERS.—Eight 4-H Club boys won a \$400 scholarship in the 1958 Firestone Tire and Rubber Company soil and water conservation contest. Here they prepare to cut a big cake. (Left to right) Raymond C. Firestone, president of the company; Wayne Anderson, Rush, Colo.; Charles B. Keller, Palmyra, Mo.; Roger Sorenson, Fallon, Nev.; Michael J. Persons, Amsterdam, N.Y.; Bob York, Hitchcock, Okla.; Clarence W. Wallace, Staunton, Va.; Clint Birkenbaugh, Kingman, Kans.; and Ray Dunlap, Jayton, Tex.

Browntopmillet—

—A Multipurpose Grass

By PAUL TABOR

A visitor riding through Georgia in late summer can see numerous fields of an unusual grass. Cattle will be grazing in some, hay baling will be taking place in others, and combines will be busy harvesting seed in quite a few more. Doves will be swarming over many fields and quail feeding along the borders next to thick cover. A few months later, the same grass may be found near many ponds to attract wild ducks.

The grass is browntopmillet (*Panicum ramosum*) a native of India. It is an old grass there but a relatively new one in the United States. The noted botanist Linneaus secured seed from India nearly 200 years ago and grew plants in his garden at Upsala, Sweden. Seed was

brought into the United States about 1915 and distributed under the name, German hay grass. I have been unable to learn who introduced it and why it had that common name.

One of the early growers was the late E. M. Bohler of Statesboro, Ga. According to his son C. O. Bohler, a 2 pound package of seed was bought in 1916 from some seedsman, probably the late N. L. Willet of Augusta, Ga. It was planted in rows and cultivated. The son was assigned the chore of keeping the doves from the small planting as seed matured. Neighbors were impressed with its growth. They obtained seed and were growing small areas near their barns in 1917 when I first saw the crop.

During World War I, an effort was made to change the name to Liberty grass. Soon after the war a specimen was incorrectly identified

Note:—The author is plant materials specialist, Soil Conservation Service, Athens, Ga.



Browntopmillet ready for seed harvest.

as a variety of browntopmillet, an American species with reddish brown seed at maturity. Browntopmillet became the common name of this foreign grass as it spread over Georgia. When the correct botanical identification was learned about 20 years later, the common name was established so well that a committee for Standardized Plant Names decided to retain it and change the common name of the original browntopmillet (*Panicum fasciculatum*) to browntop panicum.

Soon after 1920 the center of seed production for browntopmillet gradually shifted to central Georgia. George Berry of Crawford began growing it in 1921 and has produced seed each year since. He has found the demand irregular. Now a cooperator with the Brown River Soil Conservation District, Berry has found browntopmillet to be one of his key conservation crops, furnishing soil protection as well as grazing, hay, and seed. Some of his neighbors have used it for silage and for hog grazing.

With hot weather, adequate moisture, and a rich soil, browntopmillet is a fast-growing grass of good quality. It covers the soil quickly, producing a moderate yield of forage and a high yield of seed. It is used in a 1-year rotation with annual cool-season crops such as crimson clover. This rotation was developed near Athens, Ga. on the Sandy Creek Erosion Demonstration Project in 1935. It is now used on many farms. Usually rye or oats and ryegrass are planted with the crimson clover. This mixture produces a good temporary sod and efficient winter grazing.

Tom Scott, Jr., a SCD supervisor of Forsyth, Ga., has about 1½ acres of crimson clover and ryegrass for each milking cow. He fertilizes it well with 500 to 600 lbs. 4-12-12 per acre and topdresses with 50 to 60 lbs. nitrogen per acre in the spring. When seed of the reseeding crimson clover mature, the field is disced and browntopmillet sowed for hay. After several years of this rotation the millet does well with only 16 lbs. N. per acre each year. On one field now in the 8th year of this rotation, he has secured seven successive volunteer crops of crimson clover and browntopmillet with partial stands of ryegrass. Prompt disking after each seed crop matures is necessary.

Mr. Scott formerly used annual lespedeza for hay but found it too late and too moisture-



A field of browntopmillet almost ready for seed harvest.

exhausting for a grazing crop the following winter. He said: "Browntopmillet is better for me. My cows will eat the hay in preference to lespedeza hay and they will graze it in preference to Starr millet. The hay is slow in curing."

Five dairymen of Morgan County, Ga., all district cooperators, have given their opinions of browntopmillet. "I like it", said Bob Newsom, a partner in a local dairy. "I graze about 40 acres with 80 milking cows from late May to September and have an abundance of feed if good rains come."

"It's good grazing and hay," reports E. G. Stewart, of Madison. "I've been sowing it for 5 years. I use at least 500 lbs. of 4-12-12 at planting. I find the millet ripens too fast some years."

"It really paid off this year," according to John Charles Maddox who grazed 75 cows 1 hour per day from July 1 to September 10, 1958 on 25 acres and cut 1,200 bales of hay from the surplus growth. "I will plant it again next year."

Two dairy partners, Messrs. Thomas and Bennett of Madison, Ga., are not sold on it. They have never grown any but have observed it on a neighbor's farm and have found it difficult to bale. Their estimate of its value is, "too short a season of growth and too low in yield."



Browntopmillet on this poor soil makes scant growth except in spots where manure was dropped by grazing cattle.

About 100 thousand acres of browntopmillet are grown in Georgia, each summer. There has been a gradual increase since its introduction. Other States have not used it so extensively, but in some places its use is expanding rapidly.

Elmore County, Ala., a few miles northeast of Montgomery, is an example. In 1954, 100 lbs. of seed were sowed on 6 acres by district cooperator C. W. Gantt of Titus, Ala. In 1958, about 75 tons of seed were sowed on 5,000 acres by farmers in the county. More than 100 tons of seed have been saved for 1959. It has grown from an unknown grass to a well-known crop in 4 years.

Recently Mr. Gantt said, "We like browntopmillet. It's the only kind of hay now made on my farm except a little small-grain hay. We grazed a field last summer and the cows preferred it to our well-fertilized pastures of Dallisgrass and Bermudagrass. The seeds are good bird feed. We have several extra coveys of quail now because of it."

Another SCD cooperator, T. L. Crowder, of Eclectic, Ala., sows a mixture of 3 parts browntop to 1 part of Starr millet, an improved variety of cattail or pearl millet. He reports, "I have used this mixture 2 years and will use it again next year. It is better than either millet

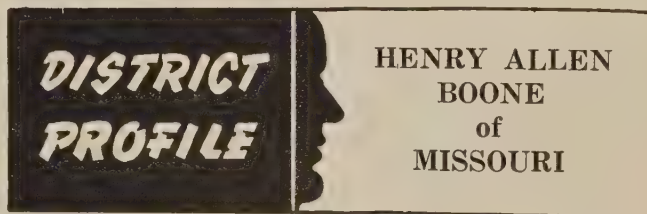
alone. In the favorable year 1958, I grazed 40 cows for 60 days on 8 acres sowed to this mixture. I also use browntopmillet for hay. The cows will leave good crabgrass hay for it."

Another SCD cooperator, J. H. Nolan, also president of Elmore County Farm Bureau, observed: "With adequate moisture it is the answer to summer grazing, being the fastest growing crop I've used. I plant about an acre per milking cow for grazing and hay. I also plant separately, $\frac{1}{4}$ to $\frac{1}{3}$ as many acres to Starr millet for grazing."

J. C. and J. R. Johnson, of Wetumpka, Ala., are growers and custom harvesters of browntopmillet hay. "A good hay crop," is their estimate of it. "It is sometimes cut too green to cure well before baling. The green seed are the slowest to dry out. It has volunteered heavily in a few fields and interfered some with the next crop."

Cooperator Charles P. Storrs, formerly SCS agronomist, evaluated it as "our best hay crop, except for possible pest qualities, and a mighty good dove feed."

Another SCD cooperator, banker A. J. Noble of Tallasee, Ala. reported, "I like it very much. It makes good grazing, excellent hay, and lots of seed."



HENRY ALLEN BOONE of Caruthersville, Mo. is now serving his 14th year as a supervisor of the Pemiscot County Soil Conservation District. He has served one term as director of the Missouri Association of Soil Conservation Districts.

Mr. Boone was born in 1881, at Boone, Colo., a town named after the Boone family. He is a direct descendant of Daniel Boone. "Henry", as he is known by his friends and neighbors, is a man of wide interests and much understanding. He grew up in the West but has lived in Pemiscot County for the past 41 years.

Mrs. Boone was raised in Pemiscot County, and taught school in Colorado where they met.



Henry A. Boone.

While back on a visit to his wife's former home years ago, Mr. Boone, who was in the livestock business in Colorado and had never farmed, noticed a Southeast Missouri Chamber of Commerce agricultural exhibit in the St. Louis Union Station. Upon questioning the attendant he learned that most of the exhibit material came from near Hayti, Mo. in Pemiscot County.

On this trip he bought his first 40 acres and stayed on to become one of southeast Missouri's outstanding citizens. At that time Mr. Boone says cotton was selling for 6¢ per pound in the seed. Chopping hands were paid \$1 a day and cotton pickers 50¢ per hundred pounds. He said you could produce cotton in those days for \$15 to \$20 per bale, and clear over \$100 per acre on some of the rich land of Pemiscot County.

When the Pemiscot Soil Conservation District was established he was elected as one of its first supervisors and immediately became interested in learning more about the soil conservation problem in Pemiscot County as well as the whole Nation. Up until a few years ago he loved to travel and in his travels never failed to look up soil conservation district supervisors and SCS work unit people. As a result he has visited soil conservation districts in Arkansas, Colorado, Illinois, Florida, Utah, New Mexico, Arizona, and Nebraska. He says, "I enjoy visit-

ing and talking with soil conservationists and other conservation-minded folks. I like to swap ideas and to see how they carry out their work."

Henry Boone's record of attendance at State, national, and local soil conservation district supervisors meetings is almost 100 percent. If he happens to miss a supervisors' meeting, or any other, you can well know there is a good reason behind it; a prior commitment or ill health. He says, "My soil conservation district activities are important to all of us. I like to know that I've done my best in serving as a supervisor in one of the many soil conservation districts throughout the country."

Pemiscot County is well-known for its cotton production and fertile soils. Mr. Boone, like all the district cooperators, places particular emphasis on his cotton crop. However, in addition to his production of cotton, corn, oil soybeans, and alfalfa, he maintains a herd of polled Hereford cattle along with plenty of improved pastures that he rotates.

He claims he is fortunate in many ways; the fact that he married Minnie Speer of Braggadocio, a small town in Pemiscot County, in 1915, is one of his good fortunes. Mrs. Boone, now retired from the teaching profession, is busy with her garden and house, and is equally interested and devoted to the teaching of soil and water conservation.

It has been a long time ago since Henry Allen Boone was selling fat cattle on the Denver market and feeders in Kansas City, but he is still selling the soil conservation district movement throughout the State of Missouri.

—HARRY B. BARKER

MORE BEEF CATTLE, LESS MILK COWS.—On January 1, 1959, there were about 96.9 million head of cattle in the United States, according to the Crop Reporting Board. This was about the same number as on January 1, 1956, the highest previous record. The number of milk cows was down to about 21.6 million, the lowest since 1921. The number of beef cattle is the highest ever.

The reports also show that milk production per cow is about 5 percent higher than ever before during mid-winter.

CHANGE OF ADDRESS SHOULD INCLUDE ZONE, OLD ADDRESS, AND CODE NUMBER.

Career Service Award

LYLE T. Alexander, chief of SCS's Soil Survey Laboratories at Beltsville, Md., was one of 10 government employees to receive the National Civil Service League's Career Service



Lyle T. Alexander.

Award for 1959. The presentation was made at a special dinner on March 2, at the Sheraton Park Hotel, Washington, D. C.

Dr. Alexander, a world leader in soil science, was the only USDA employee to be so honored this year. He was cited for his expert use of radioactive materials in agricultural research, and for his advice to the Atomic Energy Commission on the effects of radioactive fallout on soils, on plants grown in these soils, on animals contacting such soils and plants, and the exposure risks to people walking over these soils.

He joined the USDA as a junior soil physicist after graduating from the University of Arkansas in 1928. In 1935 he received his Ph.D. in chemistry at the University of Maryland. In 1953 and 1956, respectively, he received USDA's Superior Service and Distinguished Service Awards.

SOIL STEWARDSHIP WEEK.—For the fifth consecutive year, soil conservation districts are sponsoring Soil Stewardship Week. The 1959 observance begins Sunday, May 3, and continues through Sunday, May 10.

To help districts gain the widest possible observance of this occasion, the NASCD is again offering booklets, church programs, and posters at low cost.

—NOLAND J. FUQUA,
Former President,
NASCD

FEWER FARM WORKERS.—During the week of January 18-24, 1959, there were 5,269,000 farm workers in the United States, according to the Crop Reporting Board. This was the smallest number since records were started. About 4,351,000 were family workers, while 918,000 were hired workers.



JUNE 1959

Soil Conservation

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION

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SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

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U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

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TOM DALE, Editor

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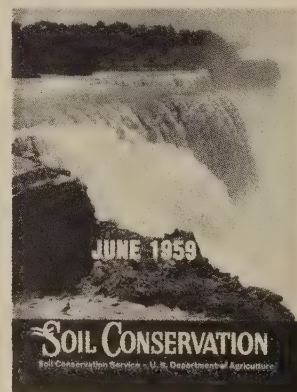


NIAGARA FALLS.—Water that drains from the Niagara River and the Upper Great Lakes rushes over the falls at the water volume rate of approximately 15 million cubic feet per minute, making it one of the most important water power areas in the world. At present, its kilowatt power is 165,000. The New York Power Authority is planning to install a capacity of 2,190,000 kilowatts in the next few years.

The American Falls have a negligible rock erosion rate because rock debris at the base of the falls acts as a buffer by giving protection to the supporting strata of softer rock.

Horseshoe Falls on the Canadian side, which carries 94 percent of the total volume of the water, has an erosion rate of 2.2 feet per year. The surface layer is hard Niagara limestone while the lower strata are the softer shale and sandstone. These give way because of the grinding and undercutting action of the water as it falls 167 feet into a deep unprotected hollow where fallen rock are rolled about like grinding tools by the surging water.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—View from the American side of Niagara Falls. Goat Island is seen in background.

Photo by Mildred DiSalvo

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Hydrology In Soil and Water Conservation

By R. G. ANDREWS

This is the first of a series of articles that attempt to explain, in nontechnical terms, the duties, responsibilities, and methods of Service hydrologists.

THE Soil Conservation Service, in carrying out its varied responsibilities, must employ a great variety of professional people. This is necessary to cope with the wide range of problems encountered. These Service employees cannot work independently in their specific fields. They must blend the knowledge of the numerous sciences involved in the development of comprehensive soil and water programs for individual farms and ranches, small watersheds, river basins, and other problem areas.

To do their work effectively it is also necessary that the various specialists have a general understanding of each other's fields, if they are to work together in accomplishing a common objective.

Among the specialists employed by SCS are a group of hydrologists. They are not as numerous as the agronomists, agricultural engineers, civil engineers, soil scientists, and some other categories. Yet, they are essential members of the team, especially where water problems are involved.

The science of hydrology is as old as the Pharaohs and as new as the supersonic jet-propelled bomber. The granaries of Egypt were dependent upon ancient hydrologists to predict the date of overflow and the height of flood-water each season on the Nile.

Nineteenth and early Twentieth Century engineers working in the field of water conservation and control, relied upon years of experience

and observations of the effects of rainfall and flowing water for the design of their works. The Congress provided the foundation for the systematic collection of hydrologic data when it authorized the organization of the U. S. Weather Bureau and the Surface Water Branch of the U. S. Geological Survey. The data assembled by these agencies provided the framework around which engineers slowly began the development of a science.

Adolph Meyer's book, "Elements of Hydrology" was published in 1928. This was one of the first attempts to collect into one volume the hydrologic principles and equations known that were in general use at that time. At the close of World War II, many water conservation and control projects were being planned and a deluge of hydrology papers and books were written by numerous engineers.

Some of the authors were primarily concerned with uncovering the fundamental principles of hydrology. Many were primarily concerned with developing working tools in the form of approximate equations and families of curves that could be used by personnel with limited experience for the solution of specific problems. The working tools so developed, multiplied the output of experienced engineers but required close supervision of less experienced engineers to prevent the use of the equations and curve families beyond their range of accuracy.

Meyer defined hydrology as "the science which treats of the phenomena of water in all its states; of the distribution and occurrence of water in the earth's atmosphere, on the earth's surface, and in the soil and rock strata; and, of the relation of these phenomena to the life and activities of man." If a few moments' reflection is given that definition, it becomes evident that a working knowledge of meteorology, geology, soil science, plant physiology, ecology

Note:—The author is head, central technical unit, Soil Conservation Service, Beltsville, Md.

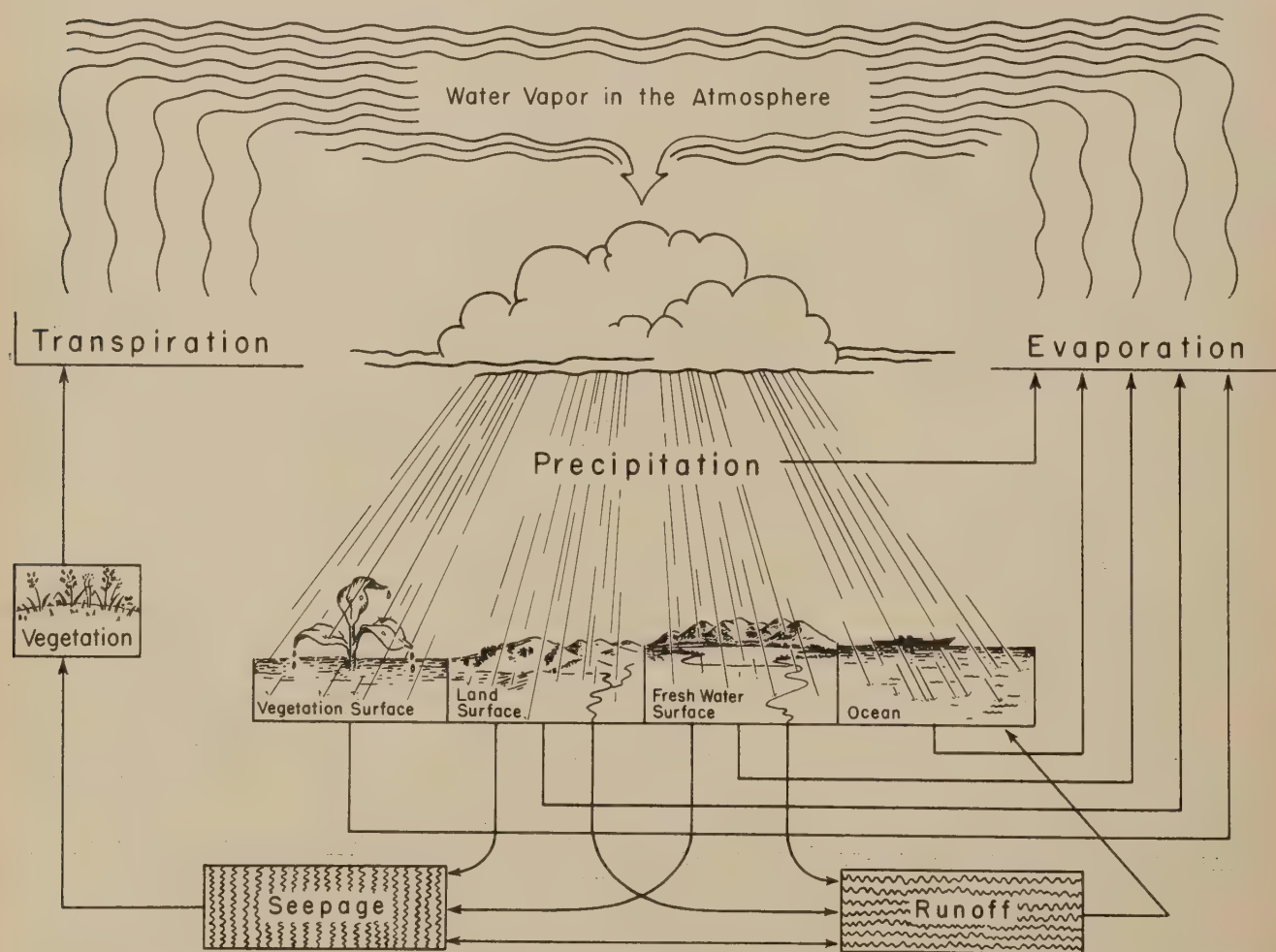
of the soil, hydraulics, mathematics, including statistics, and economics is implied.

Little or no hydrologic data are directly applicable to many of the projects we undertake. Therefore the hydrologist must use his knowledge of atmospheric behavior in order to obtain the best possible answer to our hydrologic problems. For example, excessive rates of precipitation are made possible by the cooling of warm, moisture-laden air. This cooling may be produced by the southern advance of a cold front, the northern advance of a warm front, the lifting action of mountains, or the passing of a tornado or hurricane. Each method of cooling produces characteristic rainfall patterns that are generally, but not exclusively, associated with geographic areas of the United States. Likewise, the use and loss of water through transpiration and evaporation are functions of

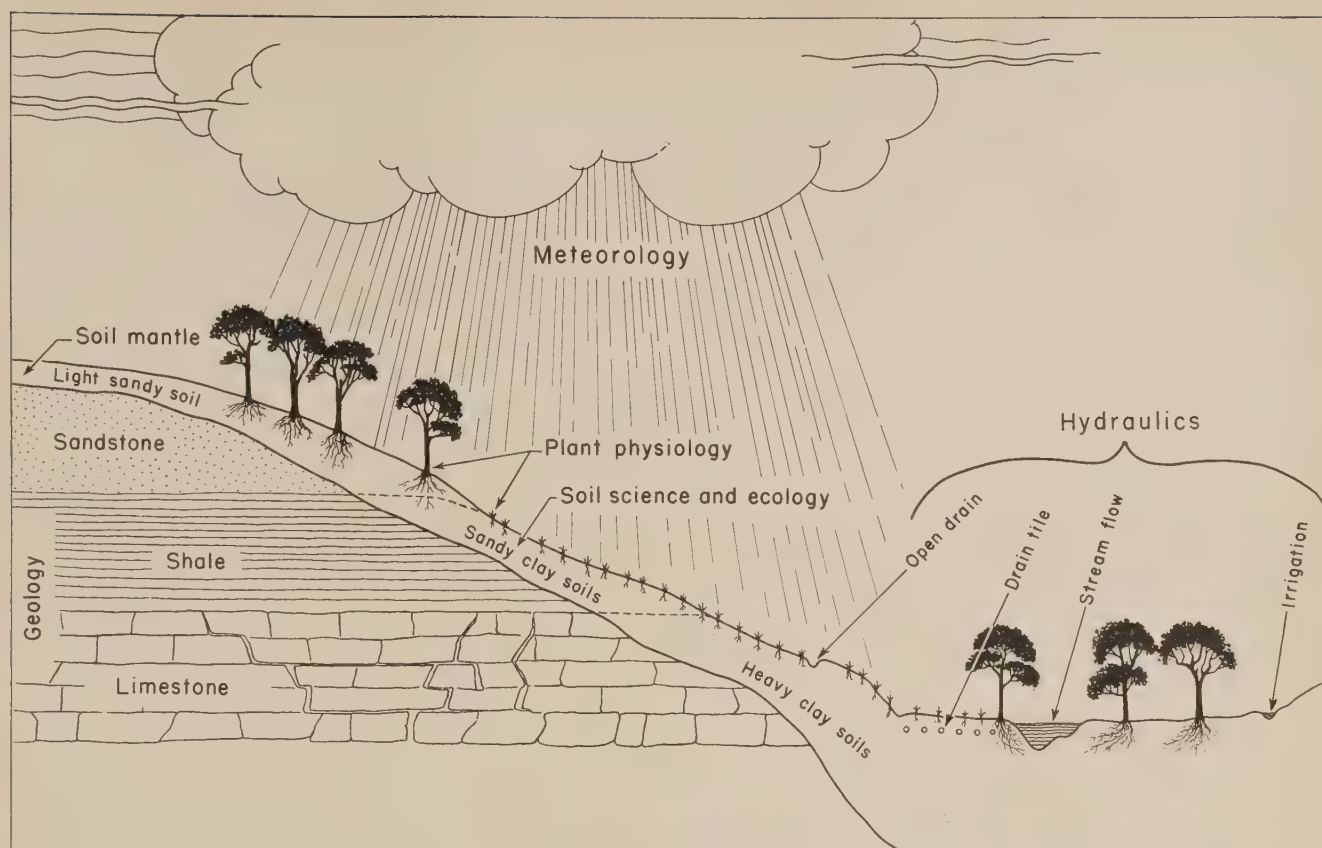
the intensity of the sun's rays that reach the surface of the earth, which is almost wholly governed by the water vapor in the atmosphere. The wind movement also determines, in part, the rate at which the processes proceed.

The hydrologist must be thoroughly familiar with the climatic peculiarities of his assigned area to properly evaluate, interpret, and use the data collected by the U. S. Weather Bureau and the Surface Water Branch of the U. S. Geological Survey.

The texture and structure of the soil, which governs its ability to admit, retain, or transmit water, is a constantly changing variable. The geographic changes are due to the interaction of the climate and the geology of the area. The changes that occur with the passing of time are due to the action of soil bacteria, the other soil organisms, the vegetation, and the effect each



In these paths the world's fixed water supply circles endlessly between the sky, land, oceans, and back to the sky.



Hydrology is a broad science drawing on many related fields and the basic sciences for much of its data and theory.

has upon the other. The texture of soils that are formed in place is directly related to the underlying rock, shale, clay, sand, or other material from which it was developed. The depth and porosity of the underlying material often governs the rate at which water storage space in the soil becomes available.

Soil structure is intimately related to the physiology of the native vegetation and the relationship of that vegetation to the microscopic plant and animal life in the soil. This delicate relationship can be encouraged or almost completely destroyed by the activities of man.

Annual plants die at maturity or with frost and leave a litter of plant debris to protect the soil surface from the puddling effect of raindrops, and leave roots to furnish food for the soil organisms. Perennial plants annually shed varying portions of their top growth, which is incorporated into the surface soil by the activity of the soil bacteria, mites, and worms. Their roots probe even deeper into the soil for plant food and to furnish support for the increasing

top growth. The constant pruning of the top growth and expansion of the root system to maintain the delicate balance between root and top development, provide channels for the passage of water and food for the minute soil organisms.

Many soil organisms secrete a waxy substance which causes the particles of fine-textured soils to stick together. The water-stable aggregates thus formed produce a coarsening of texture which increases the rate at which water can pass into and through fine-textured soil. The soil texture and structure, the vegetation, and the plant residue within and on the surface, the activity of the soil organisms, and the activities of man must be given their proper consideration by the hydrologist in determining the relationships of rainfall and runoff. Properly trained, and with sufficient experience, he is able to compute with reasonable accuracy the infiltration rate, permeability, and water-holding capacity of a watershed from data obtained during a visual examination of the geology, soils, vegetation, and the activities of man.

Hydraulics, which is often considered a separate field of engineering, is a very important segment of hydrology. Water in motion can scarcely be divorced, in our thinking, from the quantity of water. The hydrologist (hydrologic engineer is a more appropriate classification) must be well versed in the laws that pertain to fluids in motion and is often required to solve complex problems concerned with the flow of water in natural or manmade open channels or closed conduits.

Hydrology has not developed into a science which is capable of precisely evaluating the effect of all the variables encountered. It is the hydrologist's responsibility to develop limited relationships through the statistical and comparative analysis of large quantities of experimental and observational data. Empirical equations, curve fitting, nomography, probability, error of estimate, levels of significance, and confidence limits are as familiar to the competent hydrologist as they are to the research scientist.

The science of hydrology is not generally thought of as being concerned with the economic aspects of a program. However, the practicing hydrologic engineer must be ever alert to installation costs, annual costs, replacement costs, and maintenance costs. The economic feasibility as well as the success or failure of a structure may very well be determined by the care he uses in the selection of the storms for computing the installation, maintenance, and replacement costs and the proper functioning of a structure. The hydrologist must be assured that a proposed structure will accomplish the desired purpose and that satisfactory control cannot be obtained by more economical methods or structures.

The science of hydrology reaches to the very roots of soil conservation. The excess or deficiency of water affects directly or indirectly every farm plan and watershed plan prepared in cooperation with the Soil Conservation Service. Although an SCS farm planner may not consider himself a hydrologist, nevertheless, he must use his knowledge of hydrology, as well as that of soil science, agronomy, forestry, and other specialized fields in making decisions that go into the development of a farm or ranch plan.

People Are Important

The Oklahoma Association of Soil and Water Conservation Districts Features People in Most of Its Activities and Projects.

By RAY WALKER

JUDGE Lavern Fishel, president of the Oklahoma Association of Soil and Water Conservation Districts, contends that people are the most important resource available to district governing bodies to get the job done. "When people are properly informed and motivated, the conservation job will be done sooner and will stay put," Fishel emphasized.

What Fishel said, and what he has been practicing, has been the guiding principle of Oklahoma's 87 soil conservation districts and the State association for a long time.

The Judge put additional emphasis upon a condition that is becoming more important than ever before, "Our various programs are grow-

Note:—The author is State Conservationist, Soil Conservation Service, Stillwater, Okla.



Officers of the Oklahoma Association of Soil and Water Conservation Districts: (seated) Lavern Fishel, president; (standing—left to right) Hugh Green, vice president, Walter Sears, vice president, and Harral Allen, national councillor.



Jerry Case of the Marland chapter, who won the State FFA speaking contest, has just finished his address to the State Association of Soil and Water Conservation Districts. Joe Scott, president of Bankers Service Life Insurance Co., standing near Jerry, is about to present the \$50 award to the winner of the speaking contest.

ing so fast that SCD governing bodies must make effective use of every tool available if the people are to be kept current regarding progress and objectives."

To prove his point, the judge mentioned the Great Plains Conservation Program, the Small Watershed Protection Program, the Rural Development Program, the Conservation Reserve of the Soil Bank—all relatively new. In addition we have the already going programs such as Agricultural Conservation Program, flood prevention, and the regular district program of assisting operators to plan and apply needed conservation measures in accordance with the capabilities of the land.

Add to the 87 SCDs, the 60 watershed associations and conservancy districts, cooperating municipalities, civic and farm organizations, and the State and Federal agencies actively participating in the various soil and water conservation programs in the State and it is easy to see that a lot of active people are needed to keep things going properly.

To meet this challenge and to achieve their objectives, officials of the Oklahoma Association of Soil and Water Conservation Districts are making effective use of leadership and organized groups that reach into every community.

Since 1942, the Oklahoma Bankers Association has given Certificates of Award to SCD cooperators who completed and properly main-

tained the conservation measures planned for their farms. About 6,000 farmers and ranchers have received these awards.

The 360 FFA chapters of the State have been participating in the FFA-SCD Soil Conservation Contest for 4 years. The SCD governing bodies encourage the FFA chapters to sponsor speech, poster, essay, and land and grass judging contests in their local communities. Bankers Service Life Insurance Company of Oklahoma City puts \$7,500 into this program annually. Last year, 302 chapters, involving 12,000 FFA



Lavern Fishel presents former Governor, Raymond Gary, with a plaque in appreciation for "all the good things" the governor did for flood prevention and soil conservation districts during his term of office.

members, participated in the contest and helped their local districts.

For several years, the Association of Electric Cooperatives has devoted a full page in their official publication, *Oklahoma Rural News*, to inform their membership concerning Oklahoma's program of soil and water conservation. Circulation of *Oklahoma Rural News* exceeds 100,000 copies.

Last year (1958), Fishel and his coworkers developed a plan for closer work with the 267 newspapers of the State. Oklahoma SCDs were grouped according to the number of newspapers published in each district. There were five groups averaging from 14 to 26 districts in each group.

Districts are judged on the basis of number of stories and items featuring soil conservation district activities and column inches of space used in publicizing the district's program. Points are given for pictures, feature stories, editorials, full-page ads, and special editions featuring the SCD program.

Awards are given by the Oklahoma Press Association to the SCD winning first in each group. These plaques are given during the annual meeting of OASWCD.

"Our newspapers have been an important ally of districts all along, but this is the first time that the newspapers and districts have "teamed-up" at the local and State levels to do a more effective job of informing and motivating the public," Fishel stated.

In Oklahoma, SCD supervisors have encouraged the organization of ladies auxiliaries. Auxiliaries now are active at local, area, and State levels. Mrs. Paul Mungle, first president of the State auxiliary, pioneered this work. Her successors, Mrs. Cliff Thurman and the present State President, Mrs. A. H. Riney, have increased auxiliary activities. Fischel credits the ladies auxiliaries with interest and participation in observance of Soil Stewardship Week, sponsoring more and more essay and poster contests among school children, and effectively cooperating with the garden clubs and home demonstration clubs of the State.

There are many excellent examples of the districts working effectively with towns and cities in treating watersheds of municipal water supplies, providing additional storage in flood detention structures to provide an adequate water supply for urban people, and working with civic clubs to observe Farm-City Week and other activities that help to speedup the conservation job.

Perhaps one of the main reasons why more and more of the leadership in the State becomes active in working with districts, is because district supervisors are quick to give public recognition to individuals helping districts do an important conservation job. This program of recognizing persons meriting the honor has been carried out for years at local and State meetings.

However, the granddaddy of all awards meet-



Lieutenant Governor George Nigh addresses the supervisors and guests at the annual meeting of the OASWCD.

ings is the luncheon and annual dinner of the State association. At these events, individuals and representatives of organizations are given plaques and certificates before large and appreciative audiences. "Because of the coverage of these events by representatives of press, radio, and television, these presentations, take on added significance," Fishel declared.

Because OASWCD majors on people, and large numbers of people attend the annual meetings, representatives of the Congress and high

officials of all branches of State government attend. At this year's annual dinner, one of Oklahoma's Congressmen, Representative Tom Steed, was the featured speaker. Lieutenant Governor George Nigh talked at the luncheon, and more than 50 members of the Oklahoma Legislature were guests of their local SCDs at the annual banquet.

"Yes sir! In Oklahoma we believe people are important," the Judge declared with an air of finality.

SOD-BASED ROTATIONS FOR EROSION CONTROL

By A. P. BARNETT

No. 46

This is the forty-sixth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

A ROTATION is said to be sod-based when a sod-forming cover crop is used regularly in the rotation cycle. A choice of other crops then completes the cycle.

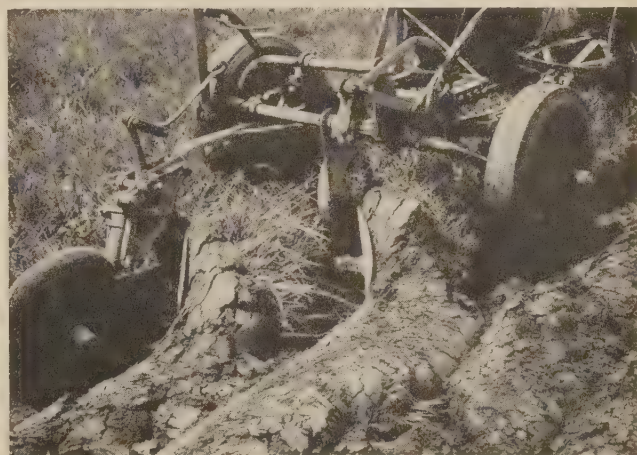
Sods are introduced into rotations for three principal reasons: (1) to reduce soil and water losses during their period of growth; (2) to increase water intake after the sods have been broken out and turned under; and, (3) to improve soil productivity. Sod-based rotations are especially well adapted for use on many sloping cropland fields where the control of runoff and erosion is a serious problem.

Sod-based rotations are an effective soil and water conservation measure when used with an adequate water disposal system. They virtually eliminate soil movement within a terrace interval and reduce surface runoff greatly.

Sod-based rotations were first established on

runoff plots at the Southern Piedmont Conservation Experiment Station, Watkinsville, Ga. in the fall of 1952. Grass was grown, usually in combination with adapted legumes, for 2 years and was then plowed out and followed for 1 or 2 years by row crops of cotton or corn. These studies were among the first true grass-based rotations set up in the Southeast.

Runoff and soil losses have been measured at the Watkinsville station for almost 20 years under a variety of cropping systems on several slopes and soil conditions. During that time, cotton was grown continually on Class III_e Cecil soil, which had a slope of 7 percent and slope



Tall fescue sod, such as this, reduces runoff and erosion during the following year even though the land is planted to a clean-tilled crop.

Note:—The author is agricultural engineer, soil and water conservation research division, Agricultural Research Service, Watkinsville, Ga.

length of 70 feet. The plots were moderately well-fertilized and planted on the contour with terraces spaced 70 feet apart. The average annual runoff loss was 22 percent of the rainfall, while 21 tons per acre of soil was lost, though these amounts varied widely from year to year. At this average rate, the soil to plow depth (about 7 inches) would be washed away in 50 years.

The variation in annual runoff and soil loss was not due to a great variation in the total amount of rainfall, but rather to the number and severity of thunderstorms. Three-fourths of the average annual soil loss occurred during the spring and summer when thunderstorms were most frequent and severe. Since the principal erosion hazard exists during the spring and summer, that is the period when sod-based rotations will offer the most protection to the land if runoff and soil losses are to be substantially reduced.

Ordinarily, it would seem a sod crop should not protect the land after the sod has been turned under and killed in order to grow the succeeding row crop; however, this is actually what happened. When a 2-year old sod of tall fescue was turned under ahead of corn on average Piedmont land, both runoff and soil loss from the corn were almost eliminated.



Fescue roots and tops on the surface, following two harrow operations, still provide a good mulch for the following clean-tilled crop.

To date, results have been highly significant. Two thunderstorms in July 1958, illustrate this point. These storms, which came just 1 day apart, caused over 10 tons of soil loss per acre from continuous cotton plots on Class III_e land, and the runoff was 43 percent. This was half of an average year's total soil loss. These were storms of the kind that can be expected every summer. Soil loss for these storms from corn following 2 years of fescue sod was only 0.2 tons per acre, and only 8 percent of the rainfall was lost as runoff. During these storms, the second year of row crops following 2 years of sod had a soil loss of 2 tons per acre and runoff of 22 percent.

Summary of Runoff and Soil Losses from Class III_e Land during the July 8-9, 1958 Storms.

Cropping Treatment	Runoff percent	Soil Loss tons per acre
Continuous Cotton	43	10.86
3-Yr. Rotation Average	7	0.16
1st Yr. Fescue	5	0.21
2d Yr. Fescue	7	0
Corn	9	0.28
4-Yr. Rotation Average	10	0.64
1st Yr. Fescue	8	0.37
2d Yr. Fescue	2	0
Corn	8	0.16
Cotton-Fescue	22	2.01

It is important to note that even though these second year row-crop losses are small, they represent a great increase when compared with the first row crop after sod. This emphasizes the fact that the erosion control effectiveness of sod has begun to deteriorate in the second year and suggests that an attempt to grow 3 would not be a good conservation practice.

These few facts illustrate graphically the years of row crop after sod on Class III_e land high degree of protection or "the erosion control effectiveness" of sod during the row-crop phase of a rotation. The effectiveness of sod in the control of runoff and soil loss in the succeeding row crop is due in part to the following factors: (1) More than 12 tons per acre of dry plant material (tops and roots to plow depth) will be incorporated into the soil when a good stand of fescue sod is turned under.

Other grass sods of similar density and durability may be expected to provide similar protection. (2) After an average of two harrow operations, fescue roots and tops provide a good surface mulch to cushion raindrop impact, resist erosion, and reduce runoff. (3) By season's end, much of the fescue residue remains undecomposed, both on the surface and in the soil. This material, because of its slow decomposition rate, is effective for a longer period in the reduction of runoff and soil loss than legume crops such as annual lespedeza. The visible plant residue of annual lespedeza sods disappears by the end of the first row-crop growing season.

Although these studies have been in operation for only a few years, these years have been nearly average with respect to soil losses, hence, it is felt that these data are indicative of long-term results.

With acceptance of grass sods in rotation with row-crops in Southeastern agriculture, several important implications appear. Through the wise use of grass, steeper slopes may be cultivated safely. The number of years of row crops after sod may be increased above current recommendations. Water yields for irrigation and livestock ponds may have to be reevaluated as marked reductions in runoff are effected by sod-based rotations.

New Uses For Sericea

Meal Pellets for Cattle and Swine Feed as Well as Pasture for All Kinds of Livestock and Poultry are Among the New Uses for Sericea Lespedeza Developed by a North Carolina Farm.

By W. O. LAMBETH

THE McNair Farms of Laurinburg, N. C. have more than 2,000 acres of sericea lespedeza which they are using very effectively in their livestock and poultry programs.

Sericea was introduced into Scotland County by the Soil Conservation Service about 15 years ago to help control wind and water erosion on deep sandy slopes. For some time little use was made of these plantings, except for erosion control.

During the dry years of 1951-54, summer forage for beef cattle on the McNair Farms became scarce. K. J. Shaw, farm manager, looked over the sericea fields and found good growth in spite of the drought. He fenced in several hundred acres and turned in the beef cattle herds.

Shaw, who is a district supervisor in the Pee Dee-Cape Fear Soil Conservation District, found that the cattle not only liked the sericea, but that they did well and gained in weight.

"After that," he says, "it was easy to see why sericea became our primary grazing crop during the summer months. Now it is not unusual to graze our cattle on it from mid-April until frost, usually about November 1.

"Then," Shaw continued, "we found that it could be grazed very satisfactorily by hogs and turkeys."

Soon thereafter, Mr. E. Harvey Evans, president of McNair Farms, and Shaw became convinced that sericea—a plant well-adapted to



Turkeys grazing on sericea lespedeza on the McNair Farms.

Note:—The author is area conservationist, Soil Conservation Service, Lamberton, N. C.



A trial planting of nematode resistant sericea lespezdeza on the McNair Farms.

their light sandy soils—offered other possibilities as livestock and poultry feed.

At first, it had been used only as an erosion control and land building plant. Later they had used it for hay and grazing. Now they wondered if this plant, which grew so well on poor land under droughty conditions, could be used

in other ways. Possibly it could be substituted for alfalfa, a crop they had never been able to grow successfully.

In July 1956, they cut two truckloads of sericea and dehydrated it. From one acre, 6,480 pounds of green, chopped sericea produced 1,950 pounds of meal with 7.17 percent moisture. This meal had the following chemical analysis: 4.05 percent fat, 15.19 percent protein, and 24.70 percent crude fibre. It also had 92.62 milligrams of carotene, equivalent to 154,367 international units of vitamin A, per pound. The sericea was cut from a field that had been mowed once for hay and averaged 10 to 12 inches in height.

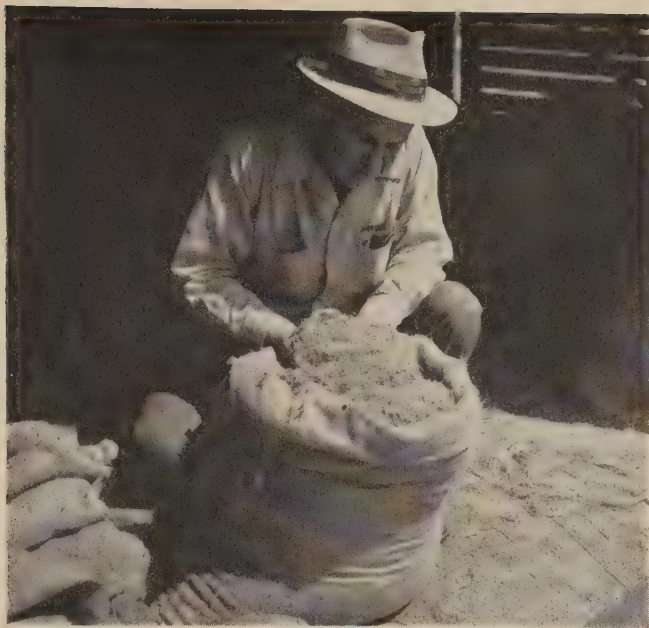
Another load cut in a different field and averaging 12 to 15 inches in height was dehydrated and the analysis was about the same. This meal was fed to dairy and beef cattle in the winter of 1956. The cattle readily ate the meal and made normal gains.

In 1957 similar tests were conducted. This time one cutting was made on an old stand that had not previously been mowed. This sericea averaged 3 feet in height and proved to be very woody with 37.90 percent crude fibre. From these tests it was evident that the sericea should be cut when young and tender to make the best quality meal.

If there had been any doubt in the minds of McNair Farms officials as to the future of seri-



Sericea dehydrating plant under construction on McNair Farms.



K. J. Shaw, farm manager, inspects a steer fattening ration that is about 50 percent chopped sericea lespedeza hay.

cea as a livestock and poultry feed, these experiments soon removed them. In mid-1958 they began erecting a modern dehydration plant and pellet mill. Their process is simple. Field chopped forage is fed into a large dump truck, hauled to the dehydration plant where it is transferred by automatic feeders to the dehydrator.

The dehydrator itself is a large rotating drum into which oil heat is forced at temperatures ranging from 1800° to 2200° F. At this temperature the forage is dried to 10 percent moisture in about 3 minutes. The dried material is conveyed to a hammermill and on to the pellet machine. It is then stored in tanks with an inert gas to prevent loss of valuable vitamins.

The present dehydrator can produce 1½ tons of dried material an hour and plans are to operate it 20 hours per day during the growing season. The plant was designed for the installation of a second dehydrating unit at a later date.

McNair Farms have 200 acres of coastal Bermudagrass which they plan to use for meal production. Similar chemical analyses have shown the meal to be high in protein and vitamin A, important supplements in beef and swine production.

Both Evans and Shaw are firm believers in the fact that the Southeast, through the use of

sericea and other adapted forage crops, can produce high-quality beef as cheap or cheaper than any other section of the United States.

"We can easily produce 3 tons of sericea hay per acre per year on land that formerly produced 200 pounds of lint cotton," says Shaw. "This year with the rains that fell we needed five times as many cows as we had to keep the sericea down."

As evidence of their faith in the use of sericea in the livestock industry, they have for 8 years been carrying on a research program. Their research staff has developed sericea plants which are highly resistant to root knot, have more leaf area, less woody stems, and a lower tannin content than common varieties.

Officials of McNair Farms have a feeling that they are pioneering the way for a new agricultural industry in the South—an industry that may discover other uses for a plant long-recognized by soil conservationists as invaluable in the field of conservation.

Farmer Sinks New Roots

Uprooted by the Rurbanization Movement in Massachusetts, a Farmer Moves to Maine and Again Starts a Profitable Truck Farming Business.

By DELBERT L. MOODY

FOR years, John S. Crosby was a contented and prosperous truck farmer at Arlington, Mass. He took pride in his family's farming record. He was the third generation to farm the same place.

Crosby was content to stay put. But "rurbanization" finally squeezed him out of Arlington, once the State's biggest truck-growing area. Suburban housing, a school, and a playground nibbled pieces out of the original 28-acre truck

Note:—The author is work unit conservationist, Soil Conservation Service, Springvale, Maine.

farm. When only 6 acres remained, Crosby gave up. He sold out and moved to Maine.

In the early spring of 1957, Crosby bought a 7-acre piece of land on U. S. Highway No. 1 near Wells, Maine. Center of a large population of "summer visitors," it was an ideal place for the wayside stand that he had in mind. When he started to prepare the land, though, he ran into his first big conservation problem. Under the surface, the land was waterlogged. It needed drainage. It needed other things, too. They included a sod-waterway to ease a brook across the field to the pond he needed for irrigation and also an outlet for his drainage system. The land needed a little clearing as some brush and a few no-account apple trees had grown up. Crosby knew that the soil would need improvement. Hay had been cut on the place for many years without anything being returned to the soil to maintain its fertility.

With all these conservation jobs needing technical attention, Crosby went to the York County Soil Conservation District for help. He signed a district agreement to apply a coordinated conservation program to his land. That entitled him to technical help from the Soil Conservation Service.

The first job was to get the land drained. So an SCS engineer laid out a drainage system, and designed a pond for it and the brook to



Summer visitors selecting berries at the Crosby wayside stand.

empty into. Crosby hired a local contractor by the hour to do the work. He put in about 2,200 feet of drainage tile 3 feet deep. One line runs the length of the farm and empties into the pond. Five laterals feed into the main tile line. The contractor dug the pond with a big back hoe. The spillways of the pond empty into a culvert that goes under the highway and takes the water to a natural draw.

The tile cost \$590.07. The contractor got \$395.50 for digging the drainage ditches and \$276 for building the pond. Crosby had the ditches filled at a labor cost of \$61.25. He paid an overall helper \$35 for labor. The entire work cost \$1,357.82 plus Crosby's time. The Agricultural Conservation Program paid about \$625 toward this cost.

These jobs done, Crosby was in business. Though late, he got a crop in and set up his wayside stand. Staying open till after Thanksgiving that first season, he took in about \$2,000. In 1958 the total take jumped to \$11,650. He expects to grow and have cut flowers at his stand and figures on doing even better.

Crosby had a temporary roadside stand in 1957. During the winter he built a spacious stand with a cellar. Tile under the cellar drains into the pond. The new stand can be converted readily into a cottage. His home, where he lives



John Crosby (left) gives Delbert Moody a sample plant from one of his cold frames.

with his wife, adjoins the stand.

Crosby plants about 6 acres. He raises several varieties of peas, corn, bush, pole, and lima beans, carrots, beets, broccoli, cabbage, Swiss chard, spinach, chicory, escarole, cauliflower, radishes, cucumbers, tomatoes, potatoes, summer and winter squash, parsnips, onions, cantaloupe, and pumpkins.

"The pumpkins," Crosby said, "are purely for the Hallowe'en trade. No one buys pumpkins for cooking any more. They get that in cans."

In 1958, Crosby added strawberries, raspberries, and asparagus. The berries will begin to produce this year but there won't be any asparagus until 1960.

Crosby is working to build up the soil's productiveness. The first year he spread 10 tons of lime on his 6 acres. He fertilizes with 8-16-16 using about 1,000 pounds an acre. In addition, he applies lots of manure that he hauls from nearby chicken farms. He is given the manure for cleaning out the hen houses. In the fall he plants a winter rye cover crop. In the spring he turns the rye into the soil. The rye protects his soil in winter, and adds organic matter to it in the spring.

Though he has a nucleus of local patronage, most of Crosby's business comes from the visitors who spend their summers at the nearby beach resorts.

"All these people are glad to pay a premium price for fresh produce," Crosby says. "They want quality, though, and they know quality when they see it. And they have certain tastes. Some go out of their way to get my peas. Others have a failing for escarole. And so it goes. I do my best to take care of their needs."

When the Crosbys are at church and at other times when they are too busy to attend the stand, a sign tells customers to help themselves and leave their money. "I have seldom lost a dime doing that," Crosby said.

When he has a surplus in any one vegetable, Crosby sells to a wholesaler in nearby Sanford. Likewise, if he runs short, he gets what he needs from the wholesaler.

"If it's something I haven't grown myself, I tell my customers," Crosby said. "I play fair with them. My first year I had some potatoes on the stand but I told my customers that I

had bought them and that they weren't Maine potatoes. Most of them said that while they were in Maine they wanted Maine potatoes, they had heard so much about them. So since then I have grown my own potatoes."

Crosby was graduated from the Massachusetts Agricultural College in 1925. (It's now the University of Massachusetts.) He majored in economics and gardening. Both are subjects that he now puts to good use. Recently he was elected vice president of the Maine Vegetable Grower's Association.

District Finds School Site

By ALBERT E. NEWBY

BETHEL, Conn., like most other towns in Fairfield County, is growing like the proverbial Topsy. During January and February 1959, 221 applications for construction of new homes were received for just the northern end of town. Houses mean children and children mean schools. Since the town schools are now overcrowded, this building boom means a new school for the Stony Hill area.

During a follow-up visit by an SCS technician to the farm of district cooperator Dick Whittlesey, the subject of school sites was mentioned. Dick is chairman of the Bethel Planning Commission and thereby vitally concerned with the changes rapidly taking place in the town. He knew that several sites were being considered by various groups. Being a farmer, he was aware that the outward appearance of land can be very deceiving.

"Can the Soil Conservation Service help the town in choosing the best school site?" Whittlesey asked the SCS technician.

He received his answer when he attended the monthly meeting of the Fairfield County Soil Conservation District and put the same question to the board of supervisors. An immediate OK was given the SCS work unit conservationist to examine all suggested sites and report his findings to the planning commission.

Note:—The author is work unit conservationist, Soil Conservation Service, Danbury, Conn.

Checking the sites wasn't much of a job because a soils map had been prepared as part of the farm conservation plan on four of the six properties considered. A soil scientist was asked to make a quick check on the two properties not mapped. Drainage was an important consideration since Bethel has no sewage system. Approximate acreages were figured using aerial photographs.

One excellent school site, which had been overlooked by all interested groups, suddenly emerged when the soils maps were examined. It was 28 acres of flat, well-drained land with access from three town roads. A pond site existed along one side of the property. With advancing years, Mr. Fred Weed, the owner, had allowed the hedgerows to grow up to brush. This brush obscured vision from one road. A narrow, brushy, wet area along another road gave the impression that the farm was one large swamp.

A report was prepared listing the soil conditions, topography, and acreage of each site. At a joint meeting of the board of education and the planning commission, it was unanimously recommended that the Weed property be purchased. Plans call for a recreational area as well as a new school. The swamp will become a shallow pond for fire protection for the school and the surrounding neighborhood. Little Leaguers, who have recently lost their ballfield to a high school addition, can begin blasting them over the fences again.

Many townspeople are sure that the Soil Conservation Service assistance furnished through the district has saved Bethel money and heartaches. Another piece of property was the choice of the majority before the soil maps were consulted. Necessary regrading of this sloping site would have uncovered a hardpan at 3 feet. Playgrounds and septic tank drainage fields in this material are not pleasant to think about.

SNOW WINDROWS.—Kenneth Rederick of Clay County, S. Dak., uses an old road grader to grade the first big snow each winter into windrows, spaced 50 to 100 feet apart. He says, "These windrows catch most of the snow for the rest of the winter and the snow really piles up."

The moisture kept on a field by the snow windrows usually increases greatly the yields of the next summer's crop.

A Stable Great Plains Ranch

A Newspaper Reporter Becomes a Successful Ranch Manager With The Aid of His Soil Conservation District and the Great Plains Conservation Program.

By LAWRENCE D. TEDFORD

THE change from a newspaper reporter in Wenatchee, Wash., to the manager of a western Kansas cattle ranch was a big one for John Cogswell, but he made it in 1945. That was when he came back to take over the management of his mother's ranch. Farming and ranching in northwestern Kansas wasn't entirely new to him because he grew up there.

The crops were good in the early forties and ranching seemed to be a prosperous enterprise at that time. John said, "I welcomed the opportunity with faith that the country would produce, and that I could realize a good living in the livestock business."

The 15,000-acre cattle ranch is in Sherman County, about 20 miles southeast of Goodland. The north fork of the Smoky Hill River meanders through the center of the ranch and provides an abundant source of water for livestock.

The spread is made up of 13,820 acres of upland range, 352 acres of native hayland, and 407 acres of cropland. Of the cropland, 331 acres are irrigated.

The topography varies from nearly level bottom land along the river to strongly sloping rangeland.

In 1945, the year that Cogswell began operating the ranch, a raging prairie fire swept through the south, burning off nearly 12,000 acres of good native grass. It was a tough blow, but fortunately rainfall the next season was a little above normal and the grass recovered rapidly.

Cogswell, being interested in a conservation

Note:—The author is work unit conservationist, Soil Conservation Service, Goodland, Kans.

plan for the ranch, called on the Sherman County Soil Conservation District for help in November 1946. He immediately began to apply soil and water conservation practices that would help him obtain the best returns. In carrying out his conservation plan, John practices proper use and deferred grazing. He believes in not grazing off more than one-half of the annual growth of desirable grasses each year. Contour furrowing, to retard runoff, was done on 2,150 acres of rangeland. Nine acres went into tree windbreaks to protect farmsteads and feedlots from the winter snows. However, he did not install all the conservation practices that he had planned.

The cost of conservation practices applied on the Cogswell ranch was partially offset by assistance given through the ACP Program.

The test came around 1950. Cogswell was running a cowherd of 550 head when the drought moved in. The carrying capacity of the range fell off rapidly and health problems in the cattle mounted. "My education in range management began at that time," Cogswell recalls.

He gradually cut his herd down and when the big drought was at its worst in 1956, he was running only 200 heifers. The grass came back rapidly in 1957 and 1958 when rainfall

increased, bearing out Cogswell's contention that sound range management during dry years pays big dividends.

"A rancher shouldn't have a cowherd any larger than he can successfully carry through a drought," Cogswell advises. "If you run a cowherd to fit the good years, more than likely you will be forced to sell the cattle on a low market when you reduce to survive the dry years."

At the present time, he is running a combination cow and steer program with his cowherd adjusted to 300 head. This program is designed to use the feed in the bountiful years, but it is flexible enough to maintain a sound program during drought periods. Cogswell is aiming towards a completely integrated program from calf to choice steer.

Nine wells produce water for his irrigated crops. The efficiency of his irrigation system was increased considerably in 1957 when he laid 3,735 feet of buried concrete pipe. This joined four of the smaller wells into one system. The power on all but three of the irrigation wells is supplied by electricity.

Corn, forage sorghum, and alfalfa are the principal crops grown under irrigation. Cogswell is a firm believer in having plenty of feed reserves. He normally puts up 1,000 tons of



John Cogswell (on horse) and Lawrence Tedford in one of Cogswell's feed lots.

silage each year. Prairie hay is used as a supplement in his winter feeding program and it makes up a large share of the harvested crops.

Some of the hayland has good stands of native switchgrass. In 1957, he harvested 2,000 pounds of seed from 10 acres.

When the Great Plains Conservation Program came into being late in 1957, Cogswell was the second one in Sherman County to sign an application. It was necessary to have a soil survey and a range site and condition survey made before all the needed conservation practices could be determined. By the following June, the Soil Conservation Service staff had assisted him in developing a complete soil and water conservation plan on the ranch. The Cogswell contract was one of the first in northwest Kansas on which practices were applied in 1958. This plan was set up to cover a 6-year period and provides for cost sharing up to 80 percent, for installing some of the conservation practices.

Under the Great Plains Conservation plan, 17,300 cubic yards of earth were moved in the summer of 1958, in the construction of stock-water ponds. Seven of the fifteen ponds planned were completed during the year. These ponds are a valuable aid in giving better distribution of grazing on the range.

In one field, a water spreading system will be installed. Runoff water will be diverted from a large draw by means of a dam and diversion onto nearly level grassland. This water will be spread uniformly by using a series of small contour ditches.

One hundred and fifty-eight acres of depleted range will be reseeded to a mixture of native grasses, including blue grama, sideoats grama, little bluestem, and western wheatgrass.

Cogswell is enthusiastic about the Great Plains program on his ranch. He says, "We can't exploit the land from year to year and expect the land to continue to support us. We can save the soil and make a living at the same time."

In 1958, John Cogswell was the recipient of the Kansas Bankers award for performing outstanding soil and water conservation practices on his ranch. He is active in community affairs, once serving as mayor of Goodland. In 1955, he represented the Farm Bureau Federation, on a tour of New Zealand and Australia.

WATER WHEN YOU NEED IT.—Until a few months ago the Spring Gulch irrigation ranchers near Jackson Hole, Wyo. knew the one thing that they could count on was that they would not have water when they needed it most.

It had been that way since the flood of 1927. That was the year the Lower Slide Lake Dam washed out after hard rains and flooded the valley below. Ditches and irrigation structures went out. After that, the river shifted from year to year. This increased upkeep and meant less water for crops than the ranchers had a right to expect.

In the fall of 1957, the water users decided to act on their problem. They all were working on complete soil and water conservation plans in cooperation with the Teton Soil Conservation District. The Spring Gulch group includes Mrs. Peter C. Hansen, Clifford Hansen, and Rod and Phil Lucas. They asked the district board for help.

The Soil Conservation Service men working with the Teton district were pretty sure the problem could be solved. It would mean building a diversion from the Gros Ventre River.

"The cost of maintenance from 1927 to the present time has doubtlessly far exceeded the cost of the new structure many times; not to mention the far greater costs in failing to have water when needed," stated Clifford Hansen.

When plans were drawn up, the group asked for ACP cost-sharing help from the Teton County Agricultural Stabilization and Conservation Committee. Since the construction site is on the lands within Grand Teton National Park, it was necessary to get permission from park officials to build the diversion.

Engineers of SCS designed the structure with four 6-foot steel headgates, and 91 cubic yards of concrete. Many truck loads of rock, 6,000 board feet of treated lumber for the main diversion core, and a 16-foot sluiceway to clear debris away from the headgate were used.

The new structure eliminates the need for yearly bulldozer work in the river channel.

With the new diversion in operation, the Spring Gulch water users not only can control their irrigation water but they also know they will get water when they need it.

—ROY H. BUCHMEIER

GROUND WATER.—Underground reservoirs of the United States contain more fresh water than all surface reservoirs and lakes combined, including the Great Lakes.

About one-sixth of all water used comes from underground sources. In many areas ground water is being used faster than it is naturally replenished. In effect, the stored water is being "mined." Water levels in wells are dropping in nearly all sections, and the irrigation projects, municipalities, and industries depending on underground water are threatened.

The Conservation Volunteer
Minnesota Dept. of Conservation

Plow-Planting Corn Saves Soil, Water, and \$'s

By WILLIAM A. HAYES

MORE farmers than ever before will plant corn right behind the plow in 1959. Farmers who have had experience with plow-planting report: (1) reduced runoff and less erosion on sloping land, (2) less flooding of low areas, and (3) improved physical condition of the soil. Other advantages include a \$4 to \$6 per acre reduction in production costs, less power and labor, less weed competition with fewer cultivations, and increased yields.

Some people plow and plant in one operation. Others modify the operation and pull a leveling

tool back of the plow, then plant in a separate operation. The latter method is more correctly referred to as "minimum tillage" than "plow-plant," since the term "plow-plant" infers that plowing and planting are done in one operation. With either method farmers eliminate costly packing operations such as disking and dragging, which contribute to increased runoff. Some compaction in the corn row is desirable in order to obtain good germination. The compacted area is attained by the use of a press wheel, shoe, or tractor wheel.

The soil between the rows is left loose to promote the intake of water. This loose con-

Note:—The author is management agronomist, Soil Conservation Service, Harrisburg, Pa.

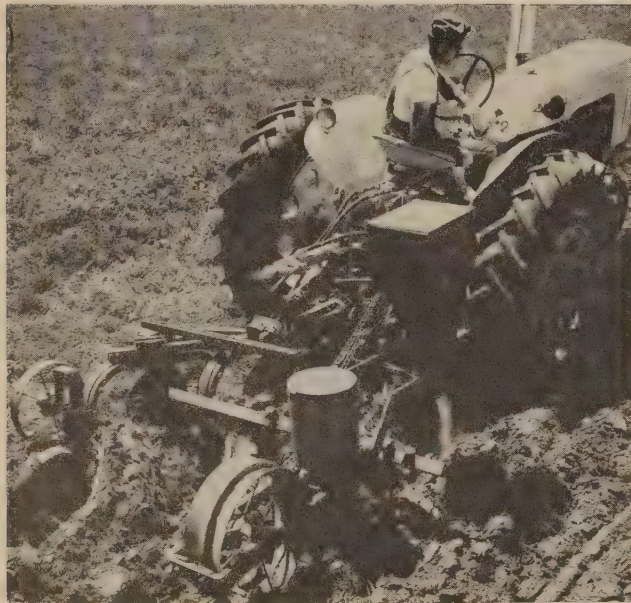


Plow-planting, pre-emergence spray of 2,4-D, and fertilizing are done in one operation on the R. L. Cook farm near Lansing, Mich. The corn yielded 103 bushels per acre with no subsequent cultivation.

dition also reduces germination of weeds. By cutting down runoff, soil erosion is reduced and water is stored in the soil where the plant can use it later in the cropping season. Flooding of low areas is less because rainfall is trapped in soil voids where it falls, giving a more even distribution over the field. The improved physical condition of the soil is a result of the reduction in number of trips over the field with heavy equipment and fewer operations with tools that tend to destroy soil aggregates.

Experimental work of the Agriculture Research Service of USDA at Coshocton, Ohio, illustrates some of the conservation merits of plow-planting. In 1955, corn was plow-planted in one plot while a similar plot was disced several times after plowing. Both plots were planted on the contour. The disced plot lost 2,208 pounds of soil per acre while the plow-plant lost only 52 pounds of soil per acre.

In 1957, two test areas were compared. One test area was plow-planted to corn across the general slope (as close to the contour as practicable) and the other area was disced, dragged, and planted on the true contour. A record-breaking $3\frac{1}{2}$ -inch rain fell during this cropping season. Specialists at Coshocton pointed out that rainfall of this intensity occurs only once in 300 years.



Plow-planting at the Soil and Water Experiment Station, Coshocton, Ohio. One row is planted with fertilizer placed several inches under the seed. The corn yielded 124 bushels per acre, with no subsequent cultivation.

Runoff results during this record-breaking rain were startling. Where the seedbed was disced, dragged, and planted on the true contour, there was a maximum rate of runoff of 5.97 inches of water per hour. Where the crop was plow-planted across the general slope, the maximum rate of runoff was 3.12 inches per hour, a savings of 2.85 inches. Soil losses paralleled runoff rates, with a loss of 6.7 tons per



Wheel-track planting of corn on the Ed Miller farm near Charlotte, Mich. The field was plowed only a few days before planting, with no intervening cultivation. Rows are spaced 54 inches apart; the yield was more than 100 bushels per acre. After one cultivation, the areas between rows were seeded to ryegrass for winter cover.

acre, where disced and 2.2 tons per acre where plow-planted. Where disced, the corn yielded 109 bushels per acres, where plow-planted the yield was 124 bushels per acre, an increase of 15 bushels. Increased corn yield is thought to be due primarily to the moisture conserved by plow-planting.

Soil Conservation Service personnel have reported less erosion where corn is plow-planted. However, the soil conservationists emphasize that plow-plant is not a substitute for contour farming but rather a supplement to contouring. Plow-plant shows evidence of providing effective soil and water conservation on short slopes of irregular topography. Farmers who haven't tried plow-planting corn or other row crops such as sugar beets, potatoes, or soybeans could well afford to try a strip through a field and compare the results.

Ten Tons Of Milk Daily— —From 480 Acres

A New Mexico Dairyman Produces a Major Part of El Paso's Milk Supply by Practicing Conservation and Improved Irrigation on His 480-Acre Farm.

By **HERBERT I. JONES** and
Y'VONNE SOPER

PAUL BLACK has more than 1,800 quality Guernsey cows and replacement heifers that turn the lush feed crops he grows into a large portion of El Paso, Texas' milk supply. He has installed every practical soil and water conservation practice on his 480 irrigated acres and has put every acre of his spread to its best use. He finds time besides to work as a leader in activities of his community.

Black started farming 25 years ago with 35 common cows and 60 acres of bosque brush pasture. "Anything we could get was good enough," he recalls.

Black located in the Hatch section of the Rio Grande Valley nearly 200 miles south of Albuquerque, N. Mex., and 100 miles north of El Paso. Irrigation then was just in its infancy, compared to the present.

It's hard to imagine, today, that much of Black's acreage was once covered with catclaw, mesquite, cottonwood, and cresote bush. But it's true. Altogether, over the years, Black has converted acres and acres of this sort of near-worthless land into soil that returns 6 to 7 tons of alfalfa per acre, 90 to 100 bushels of barley, 2½ bales of cotton, and 30 tons of corn silage per acre in response to his husbandry.

To match soil productivity improvements, Black has precision-leveled all 480 acres of cropland with power equipment so that there are few if any spots now where water must run downgrade more than a couple of inches in a field. There is practically no soil erosion. He has cut the length of irrigated rows to 800 feet

or less. There's practically no water lost through deep seepage.

To guard water until it reaches crop rows, Black has installed 3½ miles of concrete ditch lining that averages 8 feet wide. He has installed hundreds of feet of underground pipelines and has built numerous concrete water-control structures. To supplement Rio Grande River water in recent years he has drilled several new wells.

But things weren't always this plush.

If it hadn't been for Robert B. Price, now president of an El Paso creamery company, Black might never have gotten a start. They



Concrete-lined irrigation ditch with check gates on the Price-Black farms.

Note:—The authors are respectively, information specialist, Denver, Colo., and clerk, Hatch, N. Mex., of the Soil Conservation Service.

became partners in the farm venture in 1933. Things were tough for Black in those days—as almost any dairyman can testify.

“The 35 roughneck cows were all I could risk at that time,” Black recalls. But, as things got better, Black increased the pace. The present-day registered herd is the best measure of his progress.

One day recently, when 720 cows went through the tiled milk barn, over 10½ tons of milk flowed through the cooling tanks, or “Golden Guernsey,” as the Price creamery folks call it a few hours later when it is ready for El Paso housewives.

Over the years, Black’s outstanding farming record and progressive dairy management have been good business for the Price Creamery Company. Black credits Price with the assist that really mattered.

Black sought help in the early days of his land development job. And, he found it in the neighborly advice of oldtimers and in services that government agricultural agencies were offering. He took an early interest in the Caballo Soil Conservation District, helping with its organization in 1941. Later he served on its board from 1944-52.

When the district went into business Black looked up Dave Franzen, the SCS man assigned to help the district’s farmers and ranchers. Before long Black had signed a district agreement plan and gone to work.

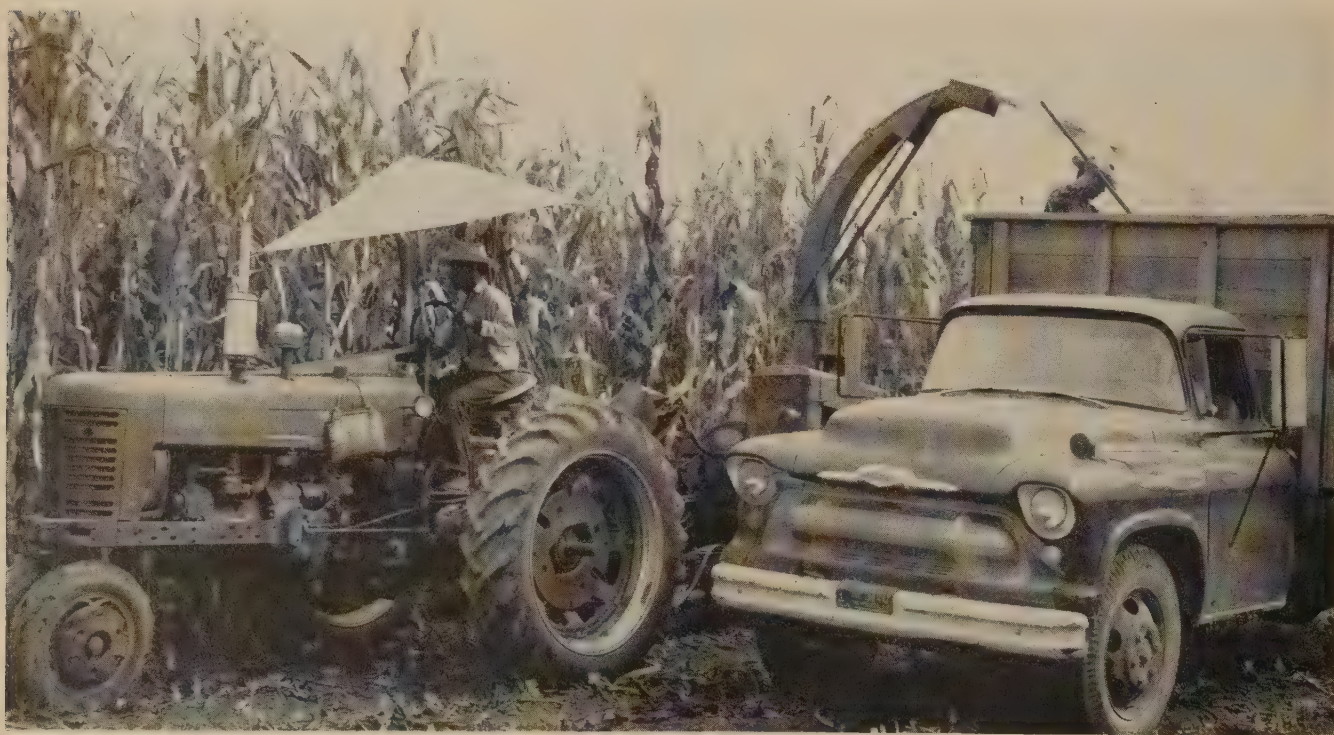
Black’s first interests were flood channels and diversions to keep water off valuable land. He took the leadership on a pooling agreement that brought 11 farmers together to channel the Tierra Blanca Arroyo. Besides his time and money, he gave up 6 acres of land to see this project through.

Next, there were levees and jetties on the Sibley Arroyo, and then a job with neighbor C. L. Welch on a mile-long hillside diversion.

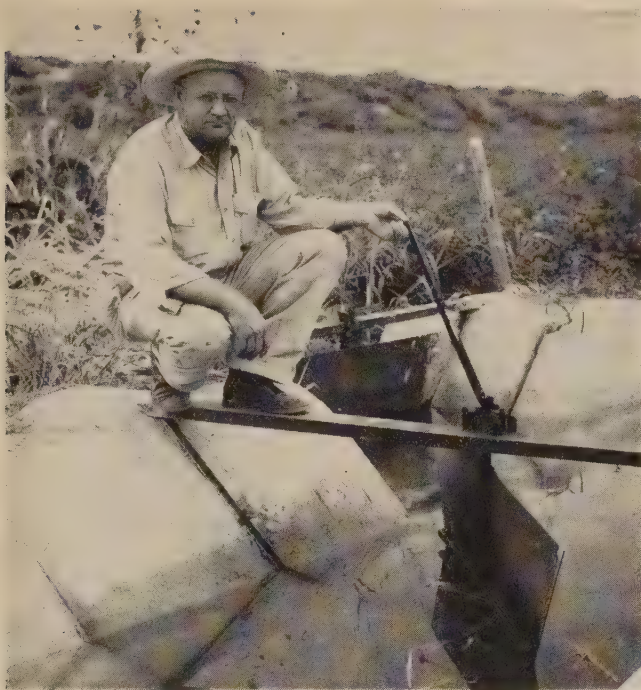
These supplemented the Montoya Channel job which was proving its worth under Black’s sponsorship. Clearing, leveling, and other improvements followed throughout Black’s community as more and more land was protected from the menace of floods.

When it came to conservation measures, Black drew no lines.

Sixteen years later he is still at it. And the farm is still expanding within itself. SCS engineers are planning the layout of additional bench leveling and irrigation ditches for 50



Harvesting silage on the Price-Black farms near Hatch, N. Mex.



A steel check gate in concrete-lined irrigation ditch that was designed and is being operated by Paul Black.

acres of newly cleared land. There are plans, too, for the fifth in a series of overnight irrigation reservoirs.

"Never leave a stone unturned when it comes to improvements," Black advises. Nothing points up that philosophy better than his pasture expansion. Today he has a 1,000-acre pasture spread to complement the cropland. Its development is a story in itself.

In addition to his land conservation measures Black has devised ways to use the byproducts of both dairy and farm. One of the most remarkable is his direct methods of fertilization.

Sluiceways bordering the stalls are drained through pipes to a sump tank. From there, the liquid manure is pumped into standby reservoirs to await delivery to the fields with the next irrigation water. Trucks work continuously hauling manure from the pens to the more distant fields. Mineral fertilizers add their bit on definite schedules.

The dairy is a well-managed wonder. Chopped alfalfa is fed green to the yard cows directly from the fields. Ensilage comes in from immense pit silos. Grains are ground and mixed with supplements in a special feed mill. Normally there are as many as 10 different rations being prepared for the different classes of live-

stock Black has on hand at one time. Mill sweepings and excess milk from the fresh cow barn go to 100 pigs—kept just for that purpose.

To prove the superiority of a well-fed and well-bred herd, Black grooms show stock on the farm for county, state, and regional competition. He personally exhibits his senior herd sire, Adohr Pretor's Prospector, Grand Champion of both the Arizona and New Mexico State Guernsey shows. He is close by when cows and heifers are in the ring.

Extensive conservation measures and sound management of the dairy farm with its bountiful productivity of quality products has established a reputation for Black. Dairymen recognize his work.

Franzen, a 20-year veteran of Hatch Valley conservation, says, "When we want to show people operations and conservation measures, we take them to see what Paul Black has done.



Paul Black shows his senior herd sire, Adohr Pretor's Prospector.

Black and his associates are pointing out the kind of dairy leadership that is helping the whole industry. Price's Creameries, for example, started with one cow and a little red wagon for their deliveries. According to a recent announcement the southwestern Price system now employs 550 with an annual payroll of \$2,250,000.

WHEEL-TRACK PLANTING.—About 200,000 acres of Wisconsin corn were planted by the wheel-track method in 1958, according to a soils specialist of the University of Wisconsin. This was about twice as much as was planted in the State the previous year.

CHANGE OF ADDRESS SHOULD INCLUDE ZONE, OLD ADDRESS, AND CODE NUMBER.

FOREIGN VISITORS

By JOSEPH B. ROGERS

THE Soil Conservation Service assisted 212 technicians from 38 foreign countries in 1958. The visitors included 115 individuals and 13 groups comprising 97 persons.

The technicians traveled and observed SCS work in 27 States and in Hawaii and Puerto Rico. Twenty-five of them studied at five SCS training centers.

Among the groups were two teams from Japan, one studying soil and water conservation and the other irrigation; two livestock teams from Brazil; one team from the Soviet Union studying irrigation and drainage; and a group of governors from Turkey studying administration of agricultural programs.

Other countries represented were: Afghanistan, Belgian Congo, Bolivia, British Honduras, Ceylon, Chile, Colombia, Costa Rica, Cuba, El Salvador, Ghana, Great Britain, Greece, Guatemala, Honduras, India, Indonesia, Israel, Jamaica, Kenya, Korea, Lebanon, Malaya, Nicaragua, Pakistan, Peru, Philippines, N. Rhodesia, S. Rhodesia, Spain, Taiwan, Thailand, Trinidad, and Yugoslavia.

Busy SCS technicians sometimes fear that visitors to their work units will interfere with their schedule of work. But William W. Fox, work unit conservationist at Artesia, N. Mex., who was host to Ilhan Berkman, of Turkey, for 2 weeks this spring, did not find this to be true.

In the words of Bill Fox, "It was a genuine pleasure to have the 2 weeks of contact with Mr. Berkman. He and I were both saddened by the necessity of his departure because he had truly become a part of our SCS family and my personal family.

"We showed him and engaged him in all our program and social activities. Nearly every night we had him in our home or took him to other homes for supper. We did not use him as an exhibition piece here from a faraway country. He has a remarkable aptitude for fitting into any situation and was just one of us—not strange at all. He and his country are friends of our country. We tried and it was easy to show our true friendship for him.

"I dreaded his coming because of an anticipated disruption of our busy schedule. He didn't disrupt a thing, and I'm very glad he came here."

THE URBAN SPRAWL.—The Nation's soil and water resources in the future will be needed for more than providing our daily bread. The additional millions of people must have space to live and play, and must use our land and water for these purposes, too.

Extensive rural acreage is being taken over by factories, airports, highways, defense establishments, recreation fields, and housing developments. This leads to a complexity of problems relating to soil stabilization, sedimentation, drainage, sewage disposal, water pollution, tax adjustments, competition for water, and many others.

Land, whether in proving grounds or pasture, still has its conservation problems. The need for soil and water conservation on non-agricultural lands must not be neglected.

—D. A. WILLIAMS, *Administrator,
Soil Conservation Service*

Note:—The author is training officer, Soil Conservation Service, Washington, D. C.

**JULY
1959**



Soil Conservation

Soil Conservation Service • U. S. Department of Agriculture

SOIL CONSERVATION.

EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

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TOM DALE, Editor

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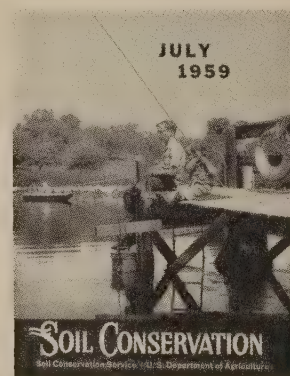


SAFE FARM PONDS.—During the past quarter century, farmers and ranchers have built nearly a million ponds as part of their soil and water conservation programs. These ponds serve many useful purposes—livestock water, irrigation, fire protection, fish production. They also serve as recreation centers for picnicking, swimming, boating, skating.

A Public Health Service survey shows that drowning was second only to farm machinery operations as a cause of outdoor accidental deaths on farms from 1949-53. Many drownings occurred in natural streams, lakes, and other bodies of water but too many occurred in ponds that did not have proper safeguards.

Many soil conservation districts are now urging cooperators who have ponds to post safety instructions around dangerous areas and provide lifesaving devices such as ring buoys, ropes, or long poles at swimming areas. To help in this safety program, the Soil Conservation Service has a new four-page illustrated leaflet, PA-396 "Make Your Farm Pond Safe—Prevent Drownings." It is available free from SCS field offices.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—A farm pond in Vermont that is equipped with essential safety devices.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Cotton Growing In Pahrump Valley

By TOM RAYNOR

FROM windblown, dusty acreages where a few years ago the new desert soils of the Pahrump Valley produced a bale or less of cotton per acre, most farmers are now harvesting two bales or more. Cotton yields have been greatly improved for most of the growers in this valley west of Las Vegas, Nev. A total of 5,488 bales, or an average of 1.96 bales per acre, were tallied up for the valley-wide harvest in 1958. As cotton is the principal cash crop, these good yields are of particular importance to this farming community.

You can credit this cotton output to the farmers' good land use efforts. They made the scientific and practical know-how gained from years of pioneering this crop on the valley desert lands pay off.

Good weather, a switch to a new cotton variety, and improved farm machinery helped. But

a great part of the increase came from soil building and soil and water conservation practices, carried out with assistance from the Pahrump Soil Conservation District.

Although some cotton was grown by early Mormon pioneers in the Moapa Valley of Nevada, large-scale cotton growing is relatively new to the State's agricultural economy. Cotton growing in Pahrump has expanded along with the development of new irrigated farmland in the valley since World War II. The first cotton to be raised successfully in Pahrump was on the Manse Ranch about 1948. Over the years many Pahrump farmers have come from the cotton growing areas of California and other States.

Nevada's acreage allotment for cotton is 3,320 acres. All but 81 acres are grown in the Pahrump Valley.

Pahrump growers make good use of up-to-date information and cooperate in adopting

Note:—The author is work unit conservationist, Soil Conservation Service, Las Vegas, Nev.



Seven mechanical cotton pickers harvested this crop on the W. J. Williams farm in Pahrump Valley.

good farming practices recommended by various State and Federal agencies working with them. These agencies include Extension Service, Soil Conservation Service, University of Nevada, the Agricultural Stabilization Committee, and the Nevada State Department of Agriculture.

A new cotton variety, Acala 1517C, has been tried and looks very promising. It is earlier maturing and seems well adapted to this climate. Acala 442 was formerly the only variety used. Both varieties have been grown the past year, but in general the 1517C is favored.

Some of the improved conservation practices that are being adopted are: crop rotation, subsoiling, increased fertilizer application, and conservation irrigation methods, along with better pest control and proper timing of planting and irrigations.

Recently, Perry Bowman, cotton grower and chairman of the Nye County Agricultural Stabilization and Conservation Committee, said: "I don't believe that top cotton yields can be made until our soils are built up through the use of soil-improving crops in rotation or with green manure crops."

Mr. Bowman has been growing alfalfa for a rotation crop. His cotton is topnotch and is picking out at better than 21½ bales per acre.

T. L. "Ted" Blosser, chairman of the board of the Pahrump Soil Conservation District along with other district board members and cooperators also boost crop rotation.

Tests made in the beginning stages of development revealed that penetration of irrigation water into most of the soils was slow. Until water penetration can be improved through



Tractor powered blowers load loose cotton on truck for transport from Pahrump Valley to gin at Blythe, Calif., 300 miles away.



Baled seed cotton is loaded on a truck for transport to a gin at Bakersfield, Calif., 400 miles distant.

deep rooted soil-improving crops, subsoiling has been found helpful in getting water down to the root zone.

Many farmers subsoil all their cotton acreage. One example is M. K. ("Tim") Hafen, who won second place as Nevada's "Outstanding Young Farmer" in the Junior Chamber of Commerce contest. Tim has been subsoiling regularly and growing some fine cotton. He is improving his irrigation system to further step up yields. He's also establishing a crop rotation with alfalfa.

Fertilizer trials are being carried out in Pahrump by Ray Peterson of the University of Nevada Agricultural Field Station at Logandale. Other trials have been made by individual farmers. Findings from these trials have encouraged heavier application rates. Nitrogen particularly has been found to be short in these desert soils.

Many concrete pipelines and concrete-lined irrigation ditches have been installed in recent years to conserve and better distribute water. These and other water conserving measures, such as land leveling, have helped make more water available to the crops. The Pahrump SCD and cooperating SCS technicians have helped district cooperators design these irrigation improvements. The ASC has cooperated

in making payments on these permanent conservation practices.

Pest control advice has been provided cotton growers by the Clark County Extension agent and the Nevada State Department of Agriculture.

The Nevada Department of Agriculture also helps in disease and insect prevention through the inspection of seed and cotton equipment brought into the State. The department has worked closely with the California State Department of Agriculture to speed movement of cotton into that State for processing.

For years, Nevada's cotton has been trucked to California gins near Bakersfield and Blythe for ginning. Cotton is packaged in small bales with a hay baler before hauling or tamped into trucks with especially high sideboards. This extra handling has been an added expense for the growers that may soon be eliminated, because a gin will be built in Pahrump and should be ready for next season's processing.

The good 1958 cotton crop in the Pahrump Valley is a tribute to the hard working farmers who pioneered raw desert land and made soil and water conservation practices pay off. And these good yields have earned for the farmers, modern farm conveniences on farms that not so long ago were windblown, dusty acreages.

DRYLAND WHEAT FARMING ON THE SOUTHERN GREAT PLAINS

By J. J. BOND and T. J. ARMY

No. 47

This is the forty-seventh of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

WHEAT after wheat, alternate wheat and fallow, or wheat-sorghum-fallow—these are the major cropping systems for dryland wheat production on the High Plains of Texas. All of these systems succeed in some years and fail in others. No crystal ball has been developed that will tell what particular cropping system should be used this year, next year, or in any series of years. However, research at the Southwestern Great Plains Field Station at Bushland, Tex., has shown that the chance of harvesting a profitable wheat crop varies considerably between the three commonly employed cropping systems.

Results from 14 years of experiments on Pullman silty clay loam soil, commonly referred to as the "Hardlands", show that continuous wheat averaged 9.7 bushels per acre. With an alternate wheat-fallow system the average yield for the same period on a cropped-acre basis was 15.7 bushels. In the wheat-sorghum-fallow system of cropping the 14-year yield average was 14.2 bushels per acre.

Although wheat is grown primarily for grain, the use of fallow in conjunction with stubble-mulch tillage may be the only way to produce enough crop residue for wind erosion control during drought periods. A comparison of the straw yields from experimental plots shows that

in no single year did continuous wheat cropping produce more straw than the wheat-fallow system. The average yearly straw yield for continuous cropping was approximately 1,400 pounds per acre, while in the wheat-fallow system about 2,500 pounds per acre were produced. On the average, continuous cropping produced about 60 percent as much straw as wheat-fallow.

Average yields, although useful, may not adequately evaluate a cropping practice. This is especially so under dryland farming where there are large yearly variations in rainfall and crop yields. Frequency of crop failures and bumper yields may be more important to the overall farming operation than average yearly yields. A comparison of grain yields from each of the cropping systems for the 14 individual years shows that with continuous wheat cropping, grain yields were less than 10 bushels per acre in 10 out of 14 years. Grain yields in the wheat-fallow system were less than 10 bushels in only 4 out of 14 years. Yields were less than 10 bushels per acre on the wheat-sorghum-fal-

Wheat yields at the Southwestern Great Plains Field Station, Bushland, Tex.

Year	Continuous wheat	Wheat-fallow	Wheat-sorghum-fallow
	Bu./A.	Bu./A.	Bu./A.
1943	7.1	14.6	6.7
1944	26.4	28.4	38.8
1945	6.9	20.4	17.6
1946	6.0	13.9	6.4
1947	34.3	36.8	34.6
1948	6.2	15.7	19.6
1949	19.4	38.4	28.9
1950	0	0	0
1951	8.6	13.0	7.4
1952	5.4	17.4	13.8
1953	0.6	2.8	2.1
1954	14.2	18.4	21.0
1955	0	0	1.8
1956	0	0	0
Average	9.7	15.7	14.2

Note:—The authors are soil scientists, soil and water conservation research division, Agricultural Research Service, Bushland, Tex.

low plots in 7 of the 14 years. Yields on both fallow systems exceeded 20 bushels per acre four times in contrast to only twice with continuous wheat cropping.

Although suggestive of what could be expected from each cropping system, 14 years of cropping data may not represent an adequate sample of the climate typical of the Southern High Plains. Under dryland conditions, precipitation is known to have a marked effect on wheat yields. The large yearly differences in grain yields are primarily a reflection of year-to-year variation in precipitation and other associated weather factors such as temperature and wind. Before truly sound estimates of the frequency of crop failures and average or bumper yields for any cropping system can be made, some understanding of the weather must be obtained. The frequency of occurrence of years favorable and unfavorable for wheat production must be established.

Because long-range weather forecasting of from 1 to 3 years is presently unavailable, weather records from the past must be examined, and the conclusions drawn from them projected into the future. Sixty-five years of U. S. Weather Bureau records from Amarillo have been evaluated and interpreted in terms of expected wheat yields. On the basis of these long-term weather records, more than

10 bushels of wheat can be expected about 80 percent of the time with either a wheat-fallow or wheat-sorghum-fallow system. With continuous cropping, more than 10 bushels can be expected only about 50 percent of the time. The chances of producing a 15-bushel crop are almost twice as great with wheat-fallow as compared to continuous wheat.

It should be pointed out that these estimates of probable grain yields for each cropping system are based on experiments conducted on Pullman silty clay loam and on rainfall records obtained near the experimental site. Inasmuch as rainfall on the High Plains generally increases from west to east, the expectation values shown would change somewhat with distance east or west from Amarillo. Chances of low yields on hardland soils would be greater as the distance west of Amarillo increases. Higher yields could be expected more often as the distance east of Amarillo increases.

Many additional facets of farming need to be considered before specific recommendations can be made regarding the superiority or inferiority of any of these three cropping systems. Cultural practices such as date of seeding, timeliness of tillage, quality and variety of seed and other factors, such as insects and hail all affect grain yield. However, these results may serve as a guide in selection of a cropping system.



Harvesting a 15-bushel crop of wheat grown after fallow at the experiment station near Bushland, Tex.

Hydrology In Soil and Water Conservation

By R. G. ANDREWS

WHY HYDROLOGISTS NEED SOIL-COVER COMPLEX DATA

This is the second and third of a series of articles that attempt to explain, in non-technical terms, the duties, responsibilities, and methods of Service hydrologists.

STATE conservationists and watershed planning specialists have, for the last few years, had many proposals about the collection of soil-cover complex data used in watershed planning. Some have advocated a statistically controlled random sample, others a complete field survey of soil types and cover conditions. Some have insisted that sufficiently accurate data could be obtained by a few minutes' conversation with work unit personnel. They all agree that soil-cover complex data is necessary.

A soil-cover complex is an association or combination of soil and vegetative cover. The combination may be used to indicate the ability of the soil to absorb water. Thus, the soil-cover complex also indicates the amount of runoff. Using the soil-cover as an index, it is possible to determine the runoff potential of an area within acceptable limits of accuracy.

Soil-cover complex data is necessary because floods are the results of storm runoff; that is, precipitation that comes faster than the soil can absorb it. A knowledge of the volume of storm runoff is necessary in the development of plans to alleviate floodwater and sediment damage. Inasmuch as it is physically and eco-

nomically impractical to measure the runoff from all headwater streams, a reliable method of computing runoff from rainfall records is necessary. Prior to 1930, storm runoff was generally computed as a percentage of rainfall. This method has the advantage of extreme simplicity, but requires considerable data for its application and makes no provisions for computing the changes in storm runoff that may occur from land use changes.

When the Soil Conservation Service began the study of flood prevention measures in 1937, it immediately recognized that methods of computing runoff from storm rainfall must be improved. A method which recognized the effect of land use practices was needed. The hydrologic literature was of little assistance. Robert Manning, in a paper presented to the Institute of Civil Engineers (England) in 1866, described the studies he made in connection with a proposed water supply for the City of Belfast. He insisted that runoff was not a percentage of rainfall but a residual, computed from monthly records of the average rainfall and runoff losses for the watershed. He did not, however, associate the losses with physical characteristics of the watershed.

R. E. Horton, in 1933, published his infiltration concept which considered runoff to be a residual of rainfall and recognized the variability of soils and vegetative cover. This appeared to be a step in the right direction.

The Service employed R. E. Horton, W. E. Horner, and L. K. Sherman as consultants to expand the infiltration theory and produce a workable method of computing the changes in

Note.—The author is head, central technical unit, Soil Conservation Service, Beltsville, Md.

surface runoff that could be expected to occur due to land use changes. The method produced by the consultants recognized the variations in the rate of rainfall, differences in soil, variations in soil moisture, the effect of cover as it varied by season and with use. These consultants worked with data collected by experiment stations and rainfall simulators. The runoff computed by their method was remarkably accurate provided all the data for its application were readily available.

Unfortunately, the type of data generally available from experiment stations was not available for most watersheds. The collection of the necessary field data was laborious and often impossible to obtain. Through the evolutionary process of use, the method was gradually simplified by the use of runoff indices for a soil-cover complex.

The introduction of the soil-cover complex indices greatly reduced the time required to compute the runoff from a series of storms, but was still dependent for accuracy upon records that were laborious to obtain and sometimes were not available. The publication of the pre-

liminary *Hydrology Guide* in November 1954, by the Soil Conservation Service introduced the idea of hydrologic soil groups and a family of soil-cover complex index curves. The thousands of soil variations recognized and mapped by the soil scientists were placed into one of four groups designated as A, B, C, and D. Each group contained soils that possessed essentially the same ability to absorb, retain, and transmit water. The soil-cover complex index curves were numbered from 1 to 100. These index numbers are not intended to represent the percentage of potential runoff. They are simply an expression of the relative runoff-producing characteristics of the complexes. The higher the number the greater is the potential runoff.

When a hydrologist says that a watershed has an average number of 82, he is merely giving an index to the runoff potential of the watershed based on land use or cover, treatment or practice, hydrologic condition, and soils. As an example, if a parcel of land is in the (C) soil group and is planted to corn on the contour, in a good rotation with proper crop residue management, the runoff curve number is 82.



Soil-cover complex data indicate the runoff potential of an area.

If the corn is replaced by a close-seeded legume drilled on the contour, the runoff curve number changes to 78.

Thus, a reliable method of computing runoff from storm rainfall has evolved which is simple in its application. The data necessary for its

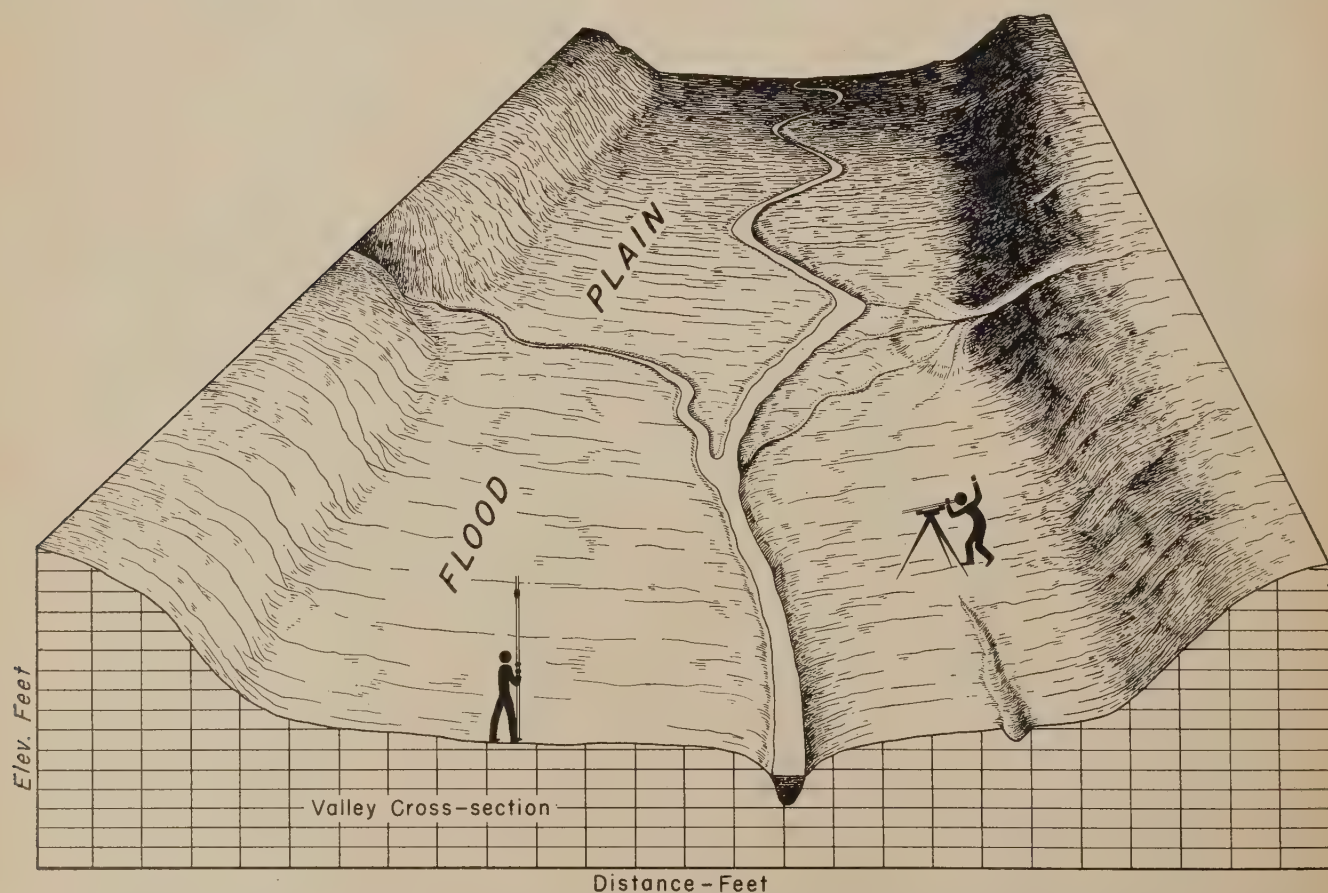
application are readily obtainable by reconnaissance surveys or simple sampling procedures. One of the basic elements in the computation of a flood history of a watershed and an evaluation of the worth of a flood prevention program now is assured of reasonably accurate results.

WHY HYDROLOGISTS SURVEY VALLEY CROSS SECTIONS

THE Congress of the United States passed three specific Acts and their amendments, that authorized the U. S. Department of Agriculture to pursue a program for the prevention of floods by detaining in watersheds the maximum feasible portion of precipitation. The Acts further specified that the cost of the program for flood prevention should not exceed the monetary benefits derived from it.

To assure that the cost of a proposed flood

prevention program will not exceed the derived benefits, it is necessary to determine with reasonable accuracy the flood history of a watershed, the damage sustained, and the effect the proposed program will have on the flooding and damages. An accurate flood history of a watershed could be obtained by canvassing the residents of the flood plain, if they all kept records of all the floods. Unfortunately, only the largest and most damaging floods are remembered



Valley cross sections provide the necessary data for computing the hydraulic characteristics of a stream.

by most of the flood plain residents. The value of the damage sustained is often a matter of speculation. The records of the U. S. Geological Survey's stream gages provide a flood record for only a small percentage of the tributary streams. These records, valuable as they are, provide information on flood heights for one or occasionally two locations on a stream.

Methods of computing the flood history of a stream from records available at only one location, and estimating flood histories from rainfall records, have been developed. The backbone of such computations and estimates is carefully selected valley cross sections prepared by plotting the ground elevations across the stream valley by straight-line surveys. The cross sections are so located that they may be used to compute the flooding, land use, and sediment and scour damage in a selected segment of the stream valley. From these computations, the average annual flood water and sediment damage sustained in the watershed is computed with much more reliability than could be obtained by the examination of available flood records.

The estimate of annual flood water and sediment damage to be expected after installation of a flood prevention program depends on information obtained from the valley cross section surveys.

MORE GRASS LESS WEEDS

By ALLEN C. PHARO

RANCHERS and farmers in Cheyenne County, Colo., are planting more and more land back to permanent cover for the third straight year.

In the past two seasons they drilled nearly 30,000 acres. Much of it was sparked by the Conservation Reserve Program of the Soil Bank and the Cheyenne Soil Conservation District's longtime farm and ranch plans.

While results of the 2 years' work still can't be finally appraised, the landowners are going

ahead, trusting that nature will be kind enough to give them a stand in spite of unfavorable weather, insects, and weeds.

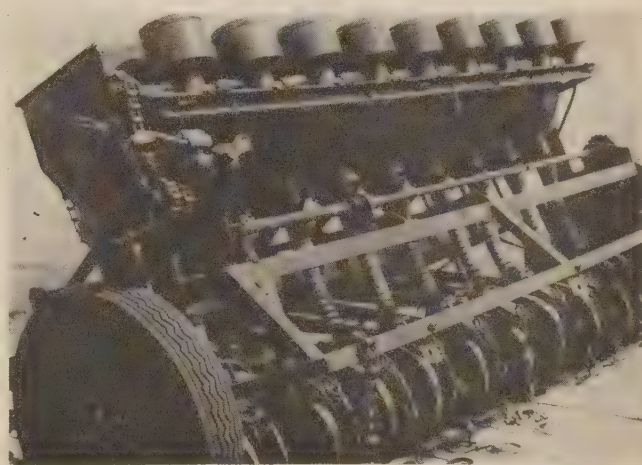
Good moisture conditions prevailed in the county during 1957-58. But grasshoppers were bad. The competition of weeds, unreliable planting dates, and often the methods of seeding made inroads on success.

In spite of the hazards, however, local conservationists are able to point out tentative conclusions to guide other ranchers and farmers. On the hard lands the most successful seed mixtures have been the ones with blue grama, side-oats grama, and western wheatgrass. On the sandy sites, bluestems and switchgrass have been substituted for the wheatgrass.

On both types of land sideoats grama has responded almost beyond expectations. So has the switchgrass on the sandy soil. A remarkable thing, conservationists say, is that only a small percentage of these grasses were included in the mixes. The high cost of these species rather than the grazing value of the grasses, influenced the amount of seed used. Now that seed prices have dropped, landowners may use more of these two grasses.

Regardless of the grasses or mixtures used in Cheyenne County it was the type of cover that proved most important to the success of plantings. Close-drilled sudangrass and sorghum stubble, left standing 10 to 12 inches high, was outstanding as a companion for the tender grass seedlings.

But many plantings were made in wide varieties of cover from uncut sorghum crops to heavy weed patches. A few optimists actually



Grass seed drill rented to cooperators by the Cheyenne Soil Conservation District.

Note:—The author is work unit conservationist, Soil Conservation Service, Cheyenne Wells, Colo.

drilled grass seed in thriving green weeds. They were disappointed.

Some of the old weed fields drilled were still ridged from the blank listing operations of the recent wind erosion years. These fields were scarcely suited for any kind of seeding. Neither were the unharvested feed crops and the lands thick with volunteer grain. The competition they afforded was too much for the delicate grass seedlings despite the favorable moisture.

As long as the competition with grass was broad-leaved weeds there was a good chance to kill them off with 2,4-D spraying, Cheyenne County folks report. Aerial application was most commonly used because it least upset routine work. Extension agents and conservationists agree that the timeliness of spraying was a big factor in the success of sprayings. Mowing, as usual, proved mostly, "too little and too late."

A few men saw their grasses killed during the last 2 years when they ordered 2, 4-D spraying too early—before seedlings reached the several-leaf stage and spraying could be safely accomplished.

Grasshopper damage to the new grasses was heavier in the weeds than in tame cover. But the grasshoppers were bad everywhere.

Timely aerial spraying for grasshoppers was not widely adopted. This year, experienced grass men are readying spray equipment almost simultaneously with their grass drilling rigs. They say they'll be ready this time.

Only a few farmers successfully converted their regular grain drills to handle the trashy native grass seeds. So, this year, as in the past two, the bulk of the drilling will be done by special drills designed to sow feather-light gramas, bluestems, and switchgrass.

The Cheyenne Soil Conservation District will help meet the demand for efficient drills through its rental program. The district supervisors early realized the difficulty of seeding with improvised equipment and bought special grass seeders. Using this service, a landowner can, if he wishes, get custom drilling of good seed by experienced men with machinery they know how to handle. Broadcasting seed has been virtually abandoned in the county. It has proved more expensive and wasteful than any other method.

The Cheyenne conservation farmers and ranchers are aware of their stake in nearly 30,000 acres of new seedings. And, they are hopeful that a high percentage of successful grass stands will appear in the final tally to substantiate their investment.

An Irish Soil Scientist At Work

By SANFORD SMITH

DURING October 1957, a tall, dark-haired, good-natured Irishman from Wexford, Ireland, came to Iowa State College to study soils. His name—Pierce Ryan.

It seems that Ireland is about to embark on a soil survey program similar to the one now being used in the United States. One of the persons considered to initiate the survey was Ryan, a grade "A" student at the National University of Dublin. Ryan had worked with the United Nations Food and Agriculture Organization in Rome for about 2 years. Some Irish authorities thought that perhaps if he had a year of study in America at some midwestern agricultural college or university, he would be the person to head the soil survey work in Ireland. The Irish government was willing to pay his expenses in America for this study.

After some weeks of correspondence, Iowa State College was selected. The soil survey program for the State of Iowa is considered one of the best in the United States, and Dr. F. F. Riecken, professor of soils, is considered one of the leaders in the field of soil morphology, genesis, and classification.

Ryan completed his academic studies at Iowa State College during the 1957-58 school year. The Irish government was looking forward to his return. But Ryan wasn't satisfied. He wanted some actual field research experience and felt he would be better qualified for the work he was to do if he could get some. This would take another year. Reluctantly, his government allowed him to stay.

Note:—The author is soil scientist, Soil Conservation Service, Muscatine, Iowa.

Ryan spent the summer of 1958 on the staff at the college completing a field research project for his master's degree. Several possibilities were considered for a project. A study of the soils of Muscatine County was finally selected. He had never been in Muscatine County, knew little about the soils, but there was an SCS soil scientist located there who could help in the work. Ryan was to do research work in Muscatine County similar to that which he would do when he went back to Ireland.

Since Muscatine County has a soil survey on statistically selected sample areas, Ryan's assignment included taking one site selected by statistical methods from each of these areas. This entailed 35 separate sites. At each site, after getting permission from the owner, he dug a pit about 3 by 5 feet in size to a depth of 3 to 5 feet, depending upon the soil material encountered. By using a post hole digger, he dug the holes 8 feet or more deep in many of the pits.

To take advantage of natural light in order to study the samples, pits were dug in a north-south direction. He worked on the north vertical face of the pit. It provided a complete and uncontaminated vertical face to serve as a study profile. Ryan marked each horizon by

putting tenpenny nails in the sides of the exposed pit.

He measured the thickness of each horizon and took a gallon sample of the soil from each subhorizon, where appreciable differences were noted. These samples were placed in paper bags. All bags were labeled accurately as to location and the thickness of the horizon or subhorizon. Thus each profile required anywhere up to eight or more samples. In addition, a small airtight sack of soil was taken from each horizon for the pH, nitrogen, phosphorus, and potassium tests.

Before filling the pit, Ryan took a 42-inch profile section, using a metal tray 1 inch deep and 3 inches wide. These monoliths, which he removed intact, were used to supplement his findings.

After spending a week in the field getting such samples, Ryan's station wagon would be pretty well loaded down with soil bags and monoliths. Saturday morning's were spent in Ames toting the soil to the laboratory where the samples of each profile were placed in a compartment for future use and study.

Other properties of soil that Ryan studied were porosity, exchangeable bases (calcium, magnesium, potassium, and hydrogen), base exchange capacity, percent base saturation, total nitrogen, total carbon, pH, and a mechanical analysis to determine the percentage of clay.

Ryan will not be able to make a complete analysis of all of these soils, but he will take back to Ireland the knowledge of how such sampling and analyses are made. At a later date, future graduate students will be able to make further studies of these soil samples that have been collected from Muscatine County.

The backache from collecting samples has been absorbed by Ryan. Future scientists can go to the laboratory and start running chemical analysis from the soil samples now collected, that are filed in compartments of the soil laboratory in the Agronomy Building at Iowa State College.

Ryan is probably the best-natured Irishman to work the business end of a spade in Iowa. "This is truly democracy," he says. "Seventeen years of schooling I have had, including 5 years of classical Greek and Latin, and here I am digging holes."



Pierce Ryan (lower left) shows some of his soil survey work to Iowa instructors.

Pasture Building On Poor Soil

By FRANK W. GURGURICH

PASTURE building by dairymen Bob and Dick Barnes on some of the oldest and poorest farmland in Marion County, Oreg., is paying off today in good milk and butterfat gains.

In the fall of 1953, the brothers were busy 4-H Club members at Gresham High School near Portland when their father, Herb Barnes, moved his family, and the livestock—a herd of registered hogs, one cow, and six heifers—south to the Willamette Valley.

It was a pretty sorry beginning for the Barnes, as Bob tells it.

"I got quite a shock when I hiked over the farm for the first time," he says. "I grew up on a farm and could tell good from bad land. Our acreage was just about the worst looking I'd seen. Most of the land had been in cereal for 50 to 100 years or so and yields were down to 10 bushels per acre.

"Much of the land was hilly with rock outcroppings all around. The residual red hill soils

were shallow, averaging 20 to 36 inches. Fertility was down, too, with little organic material. We had a lot of work to do."

Now, 15 years later, it's a different story.

Hogs are long gone and in their place is a flock of 7,500 turkeys and 75 milk cows that average better than 500 lbs. of butterfat and 10,000 pounds of milk per head.

The keys to it all are properly balanced grass and legume seedings, plenty of fertilizer, plus well-managed dryland and irrigated pastures. Its been a long, uphill climb with each new pasture helping boost the dairy's milk output.

At Silverton High, the Barnes boys switched to FFA work and pitched in and helped their father with hog raising until feed costs got too high. By 1946, the brothers were shouldering a good share of the job of running the farm.

Bob explains, "It wasn't long until we began building up our cowherd and easing off on hogs. The thing we needed most was better pasture. The catch was, our lands were so poor it wouldn't pay to reseed them. The first thing to do was build up the soils.

Note:—The author is work unit conservationist, Soil Conservation Service, Silverton, Oreg.



Part of Barnes' dairy herd on one of his improved pastures.

"We began by enriching soils with the cheapest and handiest fertilizer we could get—manure from our cowbarn and turkey sheds. Soon fertility picked up all over the farm.

"We were ready to reseed some of our land the spring of 1944. Soil Conservation Service technicians, working with the Silverton Soil Conservation District, assisted us in planning the right seedbed and picking the best grasses and legumes for our dry and irrigated pastures."

Three acres of old ground were plowed and seeded to alta fescue and subclover that spring, the first of yearly plantings and reseeding that transformed the century-old farmland into high-producing hay and pasture.

Here's the seedbed technique the Barnes' have used from the start: Soil samples are taken on the land and tested at Oregon State College to determine the amount of lime and kinds of fertilizer needed.

The ground is plowed, then barnyard manure is disked and harrowed in. Next, 500 lbs. of 11-48-0 fertilizer is put on per acre before rolling and firming the seedbed.

In the Silverton area of the Willamette Valley, where rainfall averages 45 inches, seedings of either ladino or New Zealand white clover are best with Akaroa orchardgrass.

Seedings are usually carried out in the spring with a disk drill with seed attachment at the rate of 2 to 3 lbs. of ladino or New Zealand white clover and 10-12 lbs. of orchardgrass per acre.

Irrigation water was short until 1946 when the drilling of a 150 gal. per minute well was completed. With two, wheel-type sprinkler rigs, laterals, and 30 sprinkler heads, 3 acres can be irrigated in a few hours. This operation is repeated every 9 days throughout late spring and summer.

The sprinkler irrigation rig cuts down operating labor. It used to take two men to do the irrigation job, now one man can make all the moves between settings. It's easy because laterals and sprinkler heads are attached to wheels and instead of moving each of the 40 foot long laterals separately, all of them can be moved at the same time simply by rolling. This operation is done by a cranking apparatus attached to the wheel nearest the main line.

One hundred pounds of calcium nitrate is



Bob Barnes (left) and Frank Gurgurich in a good pasture that was established on hillside soil that formerly was severely eroded and practically nonproductive.

spread before each irrigation.

To keep cows from filling up on legumes and skimming over the grasses, irrigated acreage is divided into nine paddocks of 3 acres each. Cows are turned on a fresh 3 acres of balanced, improved pasture daily. Plots are clipped and droppings scattered after each grazing to start a new regrowth of a more uniform pasture.

Using the same seedbed-making steps and seeding methods, the brothers have plowed and planted about 65 acres of rolling dryland. The dryland mix is: subclover, 5 lbs. (included because of short water); alta fescue, 6 lbs., and Akaroa orchardgrass, 8 lbs. per acre. The alta fescue stays green longer and is more desirable for turkey grazing.

Before seeding dryland, soils are tested and from 2 to 4 tons of lime applied per acre. The seeding also is fertilized with 500 lbs. of 11-48-0 and 15 tons of barnyard manure mixed with sawdust from the loafing pen.

Manure is "made" in the loafing pen. Every 3 days a 6-inch layer of sawdust is mixed well with herd droppings and a fresh layer put on the surface.

This operation is repeated until spring when the pen is cleaned out, and manure at the rate of 15 tons per acre is put on newly seeded fields.

From their dryland pasture, the Barnes' get succulent forage and around 15 tons of silage per acre. Cows graze the land in early spring and turkeys feed there the rest of the year.

Cows graze this readily after the turkey droppings have worked into the ground.

Dryland silage is supplemented by 700 tons of silage cut from irrigated pastures during April and May. A little purchased red clover is added to balance the alta fescue and sub-clover. Enough silage is cut to feed the cows from September until they go on pasture in the spring.

In the spring of 1958, the brothers seeded 5 acres of Du Puit alfalfa and Akaroa orchard-grass in alternate rows as a field trial on both dryland and irrigated land. Du Puit alfalfa, a French variety, is a vigorous grower and good producer on well-drained lands. The first cuttings of ensilage will be made during 1959.

More and more Willamette Valley and Pacific coastal farmers are changing over from broadcast seedings and mixed-seed drillings to alternate row seedings of selected grasses and legumes.

The new method has several good points. Legumes grow better in their own row than when mixed with competing grasses. Stands of

grasses and legumes are better balanced and more uniform, giving better forage, hay, and silage. And there's less competition from weeds and weedy grasses with good grasses and legumes growing side by side, in their own rows.

The job of building and managing pastures has become a routine part of the Barnes' operations and the job still goes on. All permanent pastures are plowed and reseeded every 4 years. After 4 years, production from these pastures drop off because of the heavy concentration of droppings and the disappearance of legumes from the pasture mix.

Now that their pasture program is well underway, the brothers' next goal is to build a 50-acre-foot storage dam to provide more irrigation water from late spring to fall. With more water they aim to put 25 more acres under irrigation and step up their herd from 75 to 100 cows.

Milk and butterfat outputs have increased as new pastures take hold. Since 1950, their herd of 65 to 75 cows averaged 500 lbs. of butterfat and 10,443 lbs. of milk.

Taking Advantage of the Breaks

Two Brothers in Idaho Use a Conservation Rotation, Good Water Management, and Fertilization to Make a Productive Farm from Former Desert Lands.

By VIRGIL S. BECK

“YOU’VE got to take advantage of all the breaks and use good farming methods if you want to be a successful farmer in these times of high costs and keen competition,” declares Eldon Durk, who, with his brother Max, is building a highly productive farm on 887 acres of desert land about 5 miles south of Hazelton, Idaho.

In carrying out their conservation program, the Durk brothers are practicing a good crop rotation and have developed an efficient irrigation system. All of the runoff water is caught

in three ponds and is pumped back up the slopes to head ditches for re-use. A mass production method of installing irrigation structures has been developed. These are just a few of the good management practices being followed by the Durk brothers.

Eldon, 40, resides on the 60-acre home place, about 8 miles east of Twin Falls, Idaho, that his father bought in 1913 when he moved to this part of the country. He likes to experiment with crops and fertilizers. Max, 42, lives on the new farm, and specializes in irrigation water management.

When the Durks acquired the 887 acres of

Note:—The author is field information specialist, Soil Conservation Service, Berkeley, Calif.



Max and Eldon Durk in one of their bean fields that produced about 2,500 pounds per acre.

desert land in 1952, it was covered with sagebrush. Although this is deep fertile soil, there is little organic matter in it. The annual precipitation averages only 9 inches, so efficient irrigation is essential if profitable crops are to be produced.

In 1952, the brothers cleared and leveled 380 acres, drilled an irrigation well, and planted the land to wheat. Another 100 acres were developed in 1953, and the second irrigation well was drilled. The following year another 200 acres were brought into cultivation, and the third well was drilled.

Clearing and leveling the land, drilling the wells, and installing pumps and pipes cost an average of \$96 per acre. The land is flat enough so that heavy leveling was required on only a few acres. Four houses on the farm have raised the average acre investment to \$134, the brothers pointed out. The three irrigation wells average 348 feet in depth. Drilling costs were around \$7,000, and pumps and pipe cost another \$16,000, making the cost average about \$23,000, for each well. The annual cost of all pumping operations is \$11.50 an acre.

"Although our land is fairly level, we soon found that we were losing water through runoff," the brothers said. "In fact, some of our neighbors said they were farming some of their land with the tail water we were losing."

The Durks then hit upon the idea of constructing ponds or reservoirs at strategic spots in their fields to catch the runoff water, which could then be pumped back up the slopes for re-use in irrigating their land.



Self-propelled combine harvesting peas on the Durk farm.



Max Durk at one of the pumps that forces waste water back up hill for re-use as irrigation water.

In 1953, the Durk brothers became cooperators of the North Side Soil Conservation District and called upon the supervisors for assistance in getting their land into high production. Soil Conservation Service technicians helped plan the soil and water conservation program; giving the Durks assistance in locating reservoirs for holding runoff water, pumps and pipelines, a ditch and field layout, and a crop rotation.

Three reservoirs have 17-acre feet of storage space for holding water. Sump pumps force the water back up the slopes through underground pipes. One pump-back pipe is 4,656 feet long. Another 1,740-foot pipe from one pond has two outlets.

The runoff water carries some silt into the three ponds, so after irrigation is finished each year, this silt is hauled back up the slopes to fill in low spots, thus the loss of valuable topsoil is prevented.

When the Durks started installing their irrigation ditch structures, they found they could build only three to five a day by hand, so they devised a new plan. A jeep with a trenching attachment was used to dig the excavation across the ditch where each structure was to be located. The trench is 8 inches wide, about 7 feet long, and 3 feet deep. The only forms

needed for pouring the concrete were in the ditch itself where the structure would be exposed. Ready-mix concrete was hauled out to the farm to further speed up the job. The brothers found they could install forms with this system at the rate of 65 a day.

"Water, a good rotation, and fertilizers are the combinations needed for successful farming in this area," says Eldon Durk. "We return all crop residues to the soil to build up fertility. The last crop of hay is also turned under."

The rotation provides for 1 year in peas as a nurse crop for clover or alfalfa; 1 or 2 years in clover or alfalfa; and then 2 years in cultivated crops, such as beans and potatoes.

"We believe in using lots of fertilizer; in fact, we spent \$13,000 on fertilizers in 1958," Eldon reports. "We use nitrogen, phosphate, and some zinc on beans, and potash on potatoes and grains." The Durks spent \$6,000 on mixed fertilizer used as a side dressing on 400 acres of beans in 1958. They were the first in the area to try this means of improving yields.

In 1957, the Durks had 370 acres in beans, and harvested an average of twenty-four and one-half 100-pound sacks to the acre. In some instances as many as 30 sacks to the acre were produced. In 1958, this yield was increased to an average of 27 sacks per acre on 400 acres by side dressing with a mixed fertilizer. Potatoes produced from 275 to 375 sacks per acre on 86 acres. Peas produced 50 to 75 bushels per acre on 75 acres. Hay averaged 5 tons per acre on 160 acres. Wheat averaged 87 bushels an acre on 74 acres.

Increased yields were noted on all other crops in 1958. Thirty-five acres were in mixed grain, 56 acres were in the Soil Bank, and the other 31 acres are in roads, ponds, and buildings.

The Durks have reduced their rate of seeding per acre on beans by purchasing a new and more accurate planter. In 1957, they cut their seeding rate from 100 to 85 pounds per acre, and believe they can get just as good a stand by seeding only 80 pounds to the acre. The saving in seed the first year went a long way toward paying for the new planter.

The Durks operate their farm with the help of four hired men the year around, and Max's two sons help with the farming in the summer.

Vertical Expansion

A South Dakota Farmer Devotes One-third of His Former Grain Land to a Profitable Dairy Enterprise.

By WALTER N. PARMETER

A FARM family team near Milbank, S. Dak., has paid for \$40,000 worth of new buildings and equipment with the extra profits they have realized from their dairy herd, as a result of their conservation farming plan.

The Paul Schwarzes became dairy people in 1948, when a soil examination by SCS technicians showed their land needed a conservation rotation that included hay and pasture more often in order to make the soil more workable, and also make it produce more per acre.

"Switching from grain to grass and pasture

Note:—The author is management agronomist, Soil Conservation Service, Huron, S. Dak.

was the answer to our farming problems," Schwarze reports. "My wife, Daisy, our three sons and two daughters pitched in and helped me tend our dairy cows for 10 years. Now, we have a new home, a dairy barn, and a silo to show for our work." He figures the dairy operation accounts for nearly half the annual profits from his 400-acre place.

Schwarze moved to this farm in 1936 as a tenant and began operating as a grain farmer. Returns were good enough to allow him to buy the farm in 1940, but he didn't change his cropping plans. However, he was becoming more conscious of erosion on the rolling slopes. Each year it seemed harder and harder for him to work the land. It wasn't that the soil was too light or too heavy, but still there was plenty of sheet erosion. Water seemed to run off the high land and flood the low areas faster than when he was a tenant.

Schwarze sought help from Calvin Oamek, of the Soil Conservation Service, who had been assigned to work with the Grant County Soil Conservation District as their technician. Oamek arranged for a land capability map of the Schwarze's farm, and the two went to work.

Here's how Paul Schwarze tells the story: "The farm plan Calvin helped me develop from the soil capability map included 100 acres of alfalfa-brome, a workable crop rotation, con-



Farmstead of the Paul Schwarze farm.



Paul Schwarze and part of his dairy herd on sudangrass pasture.

tour stripcropping for the cultivated fields, and several grassed waterways. These changes stopped the gully and sheet erosion and improved the soil tilth. They have increased water insoak and even the soil's water-holding capacity. All around, it has built up the fertility of our soil.

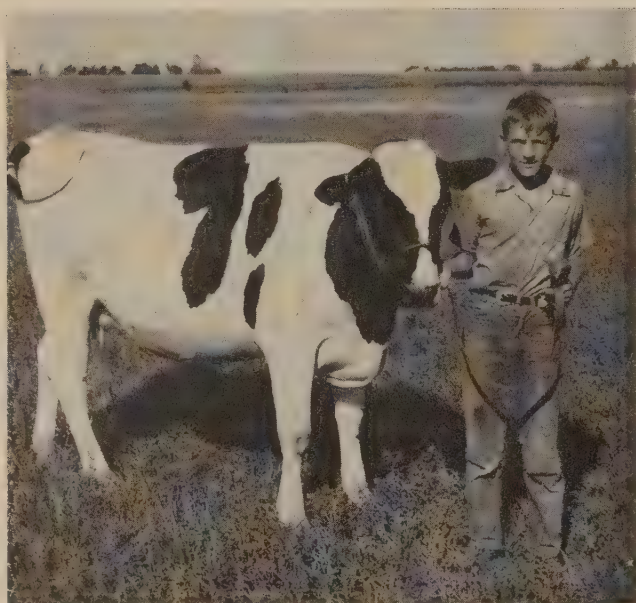
"To best use the extra hay I found myself producing, as the new plan took effect, I bought 13 Holstein cows and started a dairy. It grew, and before long I expect to build my herd up to 30 head.

"I found my best returns were coming from the pastures. Over the years, I have used three

to five of the pastures each year, moving the herd from a grazed pasture while there was still 3 to 6 inches of grass left. Each pasture gets one or more rest periods every year. That keeps them going. To aid this resting, I plant 10 to 15 acres of Piper sudangrass for temporary pasture each year. This gives me 6 to 8 weeks pasture during the hot part of the summer.

"Through rotation grazing and manuring, I have produced top forage. Last year, my herd averaged 12,000 pounds of milk per head, with a 3.7 butterfat percentage.

"Before my conservation plan made profitable the change from grain to grass, I grew only 6 acres of hay. Now, one-third of my cultivated land is in grasses and legumes. The remarkable thing about this change is that fertility and tilth of my soil has been improved so that I still get just about the same amount of grain that I used to get with straight grain farming. I've expanded my farm and never gone outside the fence. I credit the soils information and the planning help Calvin Oamek gave me."



David Schwarze with his champion 4-H dairy heifer in an alfalfa-brome pasture.

SIMAZIN CONTROLS WEEDS IN SWEET CORN.—

USDA scientists now report that a preemergence spray of simazin very effectively controls annual grasses and broad-leaved weeds in sweet corn, without adversely affecting the yield, quality, palatability, or maturity date of the corn. Best results were obtained when 4 pounds of simazine were applied per acre. The results also indicate that the chemical applied at lower rates may be effective and practical if cultivation is limited.

DISTRICT PROFILE

FLOYD E. REDFERN
of
CALIFORNIA

FLOYD E. REDFERN, of Dos Palos, Calif., is a cooperator with four soil conservation districts. He's a director of two of these districts, and the chairman of one of the boards. To make this record even more unusual, Mr. Redfern and others are pushing for the organization of another soil conservation district. This will make it possible for him to then be a cooperator with a fifth district.

Director Redfern migrated to California from Nebraska with his parents during the early 1900's. He has lived most of his life in the San Joaquin Valley.

Cooperator Redfern has varied his farming activities. His 13,000-acre cattle ranch, 9 miles northeast of Gilroy, is stocked with more than a thousand Herefords. Cooperating with the Loma Prieta SCD, he uses stock water dams, grass plantings, and range management practices to help furnish excellent forage for his cattle, and, in addition, range for nearly a thousand deer.

Principal crops grown by farmer Redfern are rice, cotton, sugar beets, alfalfa, wheat, and grass—introduced and native.

Land leveling for better water distribution, drainage to get rid of high water tables, reorganization of water distribution systems, and soil conserving crop rotations are practices regularly carried out on the thousands of acres of his Central Valley farms. His pasture and hay program includes several hundred acres of the newer grasses and legumes planted on renovated fields.

One of his biggest conservation jobs for 1959 is the installation of a \$24,000 drainage system on part of one farm in the Firebaugh SCD, about 35 miles west of Fresno.

Mr. Redfern is chairman of the board of the Poso SCD and a director of the Panoche SCD, in addition to cooperating with the Firebaugh and Loma Prieta SCD's.

The fifth district, not too far from his home base, is being organized principally for pasture-

and hay-meadow development on wet lands.

Two-and-a-half bales of cotton, 20 tons of sugar beets, and 2 tons of rice are usual returns on this cooperator's acres.

Mr. and Mrs. Redfern and daughter Suzanne are interested not only in farming. They have a deep belief in, and are doing something about, creating better understandings among the peoples of the world. During the 1958-59 school year, Karen Tvegskov, a Danish senior high school girl, was a guest in the Redfern home. She is completing her last year of secondary school at Dos Palos High School.

His interests in community activities include memberships on the school board and the Rotary Club, the promotion of 4-H Clubs, Girl Scouts, irrigation districts, water boards, and he is a director of the local Boy Scout council.

Men like Floyd Redfern created and built the soil conservation district philosophy to a reality in this area. It is men like him who will keep the district idea growing and expanding, ever increasing its usefulness to the farmer and rancher and their customers—the city dwellers.

One of Mr. Redfern's concerns today is about all the good land going into subdivisions,



Floyd E. Redfern.

industrial developments, roads, and superhighways. He believes more care can be used by public officials and private developers if soil conservation district directors and cooperators will get together with a united land-use educational program—bring the city man and the farmer closer together. “Understanding can save a lot of our best farmlands for crop production,” he states.

He helped form an organization of farmers from Crows Landing to Coalinga in the San

Joaquin Valley called the “Mid-State Water Districts and Land Owners Association.” The sole purpose was to convince the California Division of Highways to locate the proposed Westside Freeway on higher land than was originally selected. In this endeavor they accomplished their purpose. The highway is to be at about the 50-foot elevation in the nearly fog-free areas instead of on the high-value Class I and II farming lands in the valley.

—A. W. EMERSON

BAHIAGRASS IN LOWER MISSISSIPPI

By H. H. LEARD

BAHIA in Spanish means Bay but in the Gulf Coast Area it means a dependable moneymaking grass for growing livestock.

Pensacola bahia is the most important perennial grass along the Gulf Coast from Florida to Texas. It had its beginning with a few hundred pounds of seed distributed to soil conservation districts by Soil Conservation Service

nurseries from 1947-50. Soil conservationists and farmers alike were quick to see the virtues of this deep rooted, drought-resistant plant on sandy soil of the coastal area.

Prior to 1950, farmers were looking for a dependable grass that would grow on cutover timberland, and one that would supply hay and grazing during the 9-months growing season. Dallisgrass, sericea, and kudzu did not fit the bill due to climatic conditions and soil adapta-

Note:—The author is work unit conservationist, Soil Conservation Service, Purvis, Miss.



Cattle grazing a bahia-crimson clover pasture in Mississippi.



A thrifty stand of bahiagrass in a longleaf pine area of Mississippi.

bility. Bahiagrass, so important to beef and dairy production, is now a common topic of discussion any place in southern Mississippi where farmers get together to swap information.

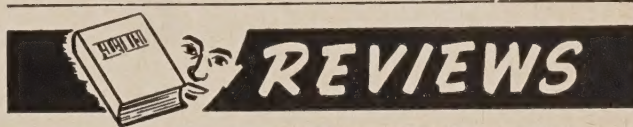
This grass has many uses in addition to providing grazing 9 months or more per year. It makes high-quality hay. When compared with other perennial grasses its hay quality is exceeded only by coastal bermuda. It is used for stabilizing waterways and on field borders to prevent erosion. In grass-based crop rotations 4 years of bahia followed by corn almost doubled corn yields as compared with adjacent land of the same soil type with no bahia in the rotation. It has also increased yields of cotton, small grains, and truck crops when grown in rotation with these crops.

Pensacola bahia has a wide soil adaptation, growing successfully on both deep sands and heavy clays. Its prolific seed producing ability makes it a plant that is fairly easy to establish. Seed yields of 800 pounds per acre have been obtained. Diseases and insects do not attack the fleshy rooted plants to any extent. Bahia grows well with crimson and other clovers when good management practices are followed.

Back in 1953, the Lamar County Soil Conservation District set a goal of 10,000 acres of bahiagrass to be established in the district. This goal has been fully realized with district co-

operators and other farmers showing no loss of enthusiasm for planting the grass. After killing frost, the top growth of bahia left standing in the pasture cures and remains upright until Christmas or longer, and cattle can winter in good condition on the cured forage with protein supplement. District cooperators refer to this as their "standing hay" or "cured hay." Hay cut from established stands of grass cures rapidly into high-quality forage and when fed to cattle results in little or no waste.

Claude Spence of Purvis, Miss., who planted the first 5 acres says, "Bahia will carry more cattle and still produce more hay than any grass I have ever used in my 35 years of growing livestock."



ECONOMICS OF AMERICAN FORESTRY.
By Albert C. Worrell. 441 pp. Illus. 1959. New York: John Wiley & Sons, Inc. \$9.75.

EVEN though this book was written as a text for a college course in forestry economics, it considers many economic concepts that are applicable to other forms of agriculture.

The chapters on "Forest Land Economics," "Capital in Forestry Production," "Labor in Forestry," and "Ownerships of Forestry Enterprises and Lands," are in themselves sufficient to merit use of the book by soil conservationists. Other chapters will also be studied, because the realistic illustrations create an interest and an understanding often lacking in text books.

In the chapter, "Forest Land Economics" Worrell states: "Land is relatively indestructible. Its characteristics can be changed and these changes may be for the worse, as far as man is concerned. The usefulness of land for certain purposes may be reduced, or, even absolutely destroyed. But this is not a necessary corollary of its use. Land may be used—under proper circumstances—without destroying it and even without changing its important characteristics. This means that although there is only a limited amount of land, it can continue

CHANGE OF ADDRESS SHOULD INCLUDE ZONE, OLD ADDRESS, AND CODE NUMBER.

to produce benefits without being used up in the process. The importance of this to the human race is obvious. But despite extensive soil conservation movements and programs, land resources are still being depleted and even destroyed." This concept is all important to soil conservationists. Is there a better way of stating it? "There is no such single identity as 'land.' Instead there is a gradation of lands of different productive capabilities." This, of course, is fundamental to the capability classification concept of the Soil Conservation Service and is used as a primary basis for conservation planning as suggested by the author. Further discussions develop its economic significance.

"Economic Rent and the Value of Land," "Subjective Values of Land," and "Land Service as a Production Cost," are additional subjects discussed in the chapter on "Forest Land Economics." The treatment of these concepts is clear and specifically applicable to the choice of alternatives of land use or the application of conservation treatments of land in its designated use.

This book will help to develop a better understanding and appreciation of the significance of economics to applied conservation.

—T. B. PLAIR

HOW GRASS GROWS, a motion picture produced by the New Holland Machine Company: New Holland, Pa. 16-mm. Sound. Color. 11 minutes.

PREVIOUS films have stressed grass and its importance as a forage crop for conserving soil and water. But this is the first film to ex-

plain why harvesting grass "too short" reduces its ability to make its best growth.

How grass manufactures food for its growth in the leaves is shown via artwork in a simulated animation sequence. The story emphasizes soil and water conservation. The film includes scenes of western rangeland as well as eastern grassland.

This film has wide appeal. It should be suitable for general audiences and schools as well as farmers and ranchers.

—HAL JENKINS



YOU CAN'T HAVE YOUR CAKE AND EAT IT TOO!

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